CANMET

Canada Centre for Mineral and Energy Technology

Centre canadien de la technologie des minéraux et de l'énergie

INDEX OF MINING TECHNOLOGY PROJECTS

1990

RCH LABORATORIES

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Canada

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S. Bezeau, R.T. Blake & R. Boyle

Mining Methods and Evaluation Group

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MINING RESEARCH LABORATORIES

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FOREWORD

In the mid-1980s, at the request of the Minister's National Advisory Committee to CANMET (MNACC), the Mining Research Laboratories (MRL) established a database on the mining technology projects being undertaken in Canada.

Organizations featured in this database are regularly contacted to update their information. At the same time, on a continuing basis, other organizations in the minerals industry are canvassed for their participation, in order to make the scope as broad as possible.

Since 1985 MRL has published the Index of Mining Technology Projects annually. This 1990 Index, published separately in English and French, is the sixth edition.

The Index is unique in that it is the only comprehensive source of information on mining research and development projects currently being carried out in Canada by companies, universities, federal and provincial agencies, and private sector organizations. The important aspect of the Index is that the majority of the projects listed are not documented in technical magazines, journals and proceedings, or elsewhere in literature. The Index, therefore, provides technical reference information that compliments published R&D work.

Section 1 of the Index lists projects by organization, whereas Section 2 lists projects by subject category. This format has been well received. MRL has been complimented both on the usefulness of the Index and on the manner in which it presents and classifies information.

We trust that the inclination of companies to share technical information, as indicated by the growth of the Index over the past six years, will continue in the future, since we are convinced that participation can contribute to increased productivity and greater international competitiveness for the Canadian mining industry.

Once again, we suggest that the Index be circulated more widely amongst technical personnel in companies and R&D establishments, as we believe that there are still potential users who do not fully benefit from this source of information.

Finally, I would like to thank all those who contributed to the 1990 version of the Index and ask for their continued support, as well as input from new participants, in the preparation of the 1991 Index.

John E. Udd, Ph.D., P.Eng.
Director
Mining Research Laboratories

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INTRODUCTION

The majority of Canadian mines are not located near urban centres, where there is usually easy access to sources of technical information at libraries, universities, government agencies and professional associations. This remoteness often makes keeping abreast of technology changes difficult and, consequently, these mines sometimes find themselves "re-inventing the wheel". If the latter can be avoided, overall mining costs can be reduced for the benefit of the mine and also the national economy.

This fact was recognized by both Industry and Government in the mid-1980s and, because CANMET had always been non partisan and its relationship with the industry at large almost always cordial, the Mining Research Laboratories (MRL) division of CANMET was asked by the National Advisory Committee to CANMET (MNACC) to establish an information system that would promote communications between operators and other segments of the industry on technology development projects.

As mentioned in Dr. Udd's foreword, the Index is compiled from the database and is published annually in both English and French versions.

This latest Index has been compiled using information gathered during the spring, summer and fall of 1990, by way of telephone conversations, mine visits and correspondence.

We would like to emphasize that the projects listed in the database and the Index are not only those in which CANMET-MRL is involved.

Although the Index only lists current mining projects, the data on projects that have been completed, postponed or abandoned are preserved in the database.

MRL does not possess detailed information on non CANMET projects listed in the Index. For this information, readers should contact the persons listed on the appropriate pages in Section 1 of the Index, as noted below.

The Index enables someone interested in a particular project or technology to contact the organization performing the work, without channelling their inquiry through CANMET. The amount of information divulged in such an inquiry is dependent on the two parties concerned, therefore, the usefulness of the Index depends entirely on the

participation of the people and organizations using it. We trust that the inclination of companies to share technical information will continue to grow in the future as this is one vital way to improve the productivity and international competitiveness of the Canadian mining industry.

There is always some doubt about the definition of mining research and development and whether such projects differ from those operational improvements all mines strive for on a daily, monthly, or annual basis. For the purpose of this Index, all "research projects" submitted have been listed, including some pertaining to mineral processing, although CANMET's Mineral Sciences Laboratories (MSL) compiles and publishes a similar index for technology projects in this field.

In the 1989 Index we indicated that the number of categories would be increased from 12 to 15 for the 1990 publication, to facilitate a more practical and "user-friendly" split of technologies. The implementation of this change was postponed until 1991 so that the necessary programming and database changes could be done concurrently with the transfer of the MRL electronic data system from a VAX computer to a Sun 3/160 using a UNIX system.

Without question, the management and staff at the majority of mining properties see the advantages of changing one or more aspects of their operations, to improve productivity and lower costs per unit mined. Other advantages of technology change include improved health and safety, better environmental controls and enhanced methods for resource conservation, to name a few.

Whatever the circumstances, most operators are trying to incorporate new technological concepts into their mine operations. Although similar, no two operations are exactly alike and therefore ideas implemented in one mine often cannot be used in another without some modification and, as a result, nearly every operator must undertake some original thinking on such matters. We believe that a publication such as the Index can help this process with its listing of technically related projects which, in the majority of cases, cannot be found in technical publications or regular commercially available technical databases.

SECTION 1

Projects Listed by Organization

Brenda Mines Ltd.,
Brenda Mine,
P.O.Box 420,
PEACHLAND, BC,
V0H 1X0

R. Ron Brown
Project Manager
Tel: (604) 763-3220
Fax: (604) 860-0324

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Reclamation work on tailings dam and waste dumps, including resloping.	3
2. Evaluation of the effects of water flowing through surface waste rock dumps/piles.	3

Cominco Limited,
Sullivan Mine,
Box 2000,
KIMBERLEY, BC,
V1A 2G3

R.M. Henningson
General Manager,
Tel: (604) 427-8221
Fax: (604) 427-8201

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing the program to control diesel emissions underground by the gradual introduction of ceramic filters on all dieselized equipment.	9
2. Development of mine-wide computerized database system.	1
3. Continuation of a study to develop better mechanized mining methods for use in low dipping (20 to 40 deg.) pillar recovery mining operations.	4, 7
4. Blast monitoring program.	7,11

Ron Van Ooteghem, Planning Engineer
Tel: (604) 427-8257 Fax: (604) 427-8201

1. An evaluation of the LYNX 3D computer modelling system for use in mine planning and engineering services.	4,11

C.W. Shin, Mine Engineering Superintendent,
Tel: (604) 427-8290 Fax: (604) 427-8201

1. Continuing study for optimum ground support system in the main retreat caving front.	10

John Guselle, Mine Planning Engineer
Tel: (604) 427-8257 Fax: (604) 427-8201

1. An investigation of blind boxhole drilling as an alternative to conventional slot-raise development. 7, 5

Cominco Limited,
Polaris/Pine Point Operations
POLARIS, NT,
X0A 0Y0

A.J. Keen
Manager
Tel: (819) 253-6001
Fax: (819) 253-6039

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Pillar mining at the Polaris mine using frozen backfill. Ongoing search for ways to ensure steady supply of good quality backfill material.	7,10

Echo Bay Mines Ltd.
Lupin Operations
LUPIN, NT
X0E 1M0

Tim Bryson
Chief Engineer
Tel: (403) 429-8750
Fax: (403) 429-8766

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Longhole mining of narrow ore bodies with small, mechanized equipment.	4, 7
2. Development of a new artificial sill pillar design.	4, 6

Fording Coal Limited
Fording River Operations,
P.O. Box 100
ELKFORD, BC
V0B 1H0

J. Andrusiak
Superintendant, Processing
Tel: (604) 865-2271
Fax: (604) 865-4444

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. On-line ash and moisture analysis of clean coal.	12
2. Dryer and washplant distributed control system conversion.	12
3. Pilot scale flotation tailings thickening and dewatering trials.	12

Giant Yellowknife Mines Ltd.
Giant Mine
P.O. Bag 3000.
YELLOWKNIFE, NT,
X1A 2M2

G.A. Wolfe, P. Eng.,
Chief Engineer,
Tel: (403) 873-6301
Fax: (403) 920-2980

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Hydraulic reclamation of 10,000 tonnes per day of frozen tailings for the recovery of gold by the carbon-in-leach (CIL) process.	12

Kent Morton, Technical Project Supervisor
Tel: (403) 873-6301 Fax: (403) 920-2980

1. High temperature filtration of roaster exhaust gas to produce a high quality arsenic product and to recover residual gold values.	12

Nanisivik Mines Ltd.,
P.O. Box 225
NANISIVIK, NT,
X0A 0X0

J. McConnell
Mine Superintendant
Tel: (819) 436-7376
Fax: (819) 436-7435

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Continuing development of mining techniques in ice and permafrost conditions.	4
2. Removal of high (over 20 m) post-pillars from an existing open room and pillar stoping area (equipment and ground control considerations).	3

Westar Mining Ltd.,
Greenhills Operations,
P.O. Box 4000
ELKFORD, BC,
V0B 1H0

R. Porter
Superintendent Engineering
Tel: (604) 865-3325
Fax: (604) 865-3250

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Ground stability of a moderately dipping coal seam footwall.	10

Steven Little, Supervisor, Pit Engineering
Tel: (604) 865-3304 Fax: (604) 865-3250

1. Interactive short and long term open pit production scheduling system using micro-computers.	4,11
2. Enhancements to the production monitoring and control system (PMCS) for pit operations (units in shovels).	7,11
3. Raw coal ash analyzer to provide advance knowledge of feed quality and improved plant efficiency.	12
4. Bucket load weighing unit for hydraulic shovels.	2, 5
5. Engineering systems upgrade.	5

Westmin Mines Limited
Myra Falls Operations
P.O. Box 8000
CAMPBELL RIVER, BC
V9W 5E2

Charles L. Stafford
General Manager
Tel: (604) 287-9271
Fax: (604) 287-7123

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE

R. Van Dyk, Environmental Engineer
Tel: (604) 287-9271 Fax: (604) 287-7123

1. Cementation of waste rock to effect control of acid mine drainage.	3
2. Sub-aerial tailings deposition.	3, 5

Mr. D. Botsford, Senior Mine Engineer
Tel: (604) 287-9271 Fax: (604) 287-7123

1. The influence of rock mechanics considerations on mine design and short and long-term stability.	4,10
2. Prevention of secondary sulphide dust ignitions/explosions.	9
3. Computer modelling of the H.W. Mine ventilation system.	9,11
4. Evaluation of ceramic exhaust filters on load-haul-dump (LHD) equipment.	1, 9
5. Noise abatement for surface ventilation fans.	3

Central Canada Potash,
Noranda Minerals Inc.,
P.O. Box 1500
COLONSAY, SK,
S0K 0Z0

Dr. A.M. Coode
Chief Mine Engineer
Tel: (306) 944-2170
Fax: (306) 944-2707

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. A field test program to evaluate the use of waste salt backfill in Saskatchewan potash mines.	10
2. Tri-axial creep test on sylvite occurring in a Saskatchewan potash mine.	10
3. Basic research into the control of brines around underground bulkheads in Saskatchewan potash mines.	10
4. Assessment of longevity of grouts used underground in Saskatchewan potash mines.	10
5. Solution mining for disposal of salt tailings.	2, 3

W.C.H. Kruining, Technical Services Supervisor
Tel: (306) 944-2170 Fax: (306) 944-2707

1. Recirculation of exhaust air in potash mines.	9

Cigar Lake Mining Corporation
410-224 Fourth Avenue S.,
SASKATOON, SK,
S7K 5M5

John A. Nightingale
President
Tel: (306) 665-2628
Fax: (306) 665-7401

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground testing of a mining method for a very high-grade uranium deposit.	4

Hudson Bay Mining and Smelting Co. Ltd.,
Ruttan Operation
P.O. Box 900
LEAF RAPIDS, MB
R0B 1W0

M. Kirby
General Manager,
Tel: (204) 473-2415
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE

Andy Gottzmann, Chief geologist
Tel: (204) 473-2415

1. Cable bolting studies: literature search; install grouted cable bolts in crown pillar; determine effectiveness; verify influence of blasting using finite element technique. 10

2. Develop the pre-and post-processor modules in a micro computer environment for the MINTAB and OFREEF programs. 10

Edgar J. Wright, Senior Geologist
Tel: (204) 473-2415

1. Failure criterion for a Jointed Mass - pending approval by strategic Grant Selection Panel. 10

International Minerals
and Chemical Corporation (Canada) Ltd.,
Potash Division,
ESTERHAZY, SK,
S0A 0X0

Jan Beno
Manager, Metallurgy
& Development,
Tel: (306) 745-3931
Fax: (306) 745-3931

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Study of overburden movement and pillar behaviour in extracted (mined-out) areas.	10
2. Seismic monitoring.	10
3. Pulse E.M. for identification of conductive anomalies near potash mine workings.	10

Potash Corporation of Saskatchewan,
Suite 500, 122 - 1st Avenue
SASKATOON, SK,
S7K 7G3

Michael J.S. Woolley
Manager, Earth Sciences
and Mining
Tel: (306) 933-8535
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Kenneth Buchinski, Senior Mine Development Engineer Tel: (306) 933-8535 Fax: (306) 652-2699	
1. Laser based rangefinder system.	11
2. Develop radio control system for continuous miner.	11
3. Full automation of continuous miner by intergration of ore grade analysis, artifical vision, ultra-sonic sensor, inclinometer and tram control systems.	11
4. Hoist rope lubricant friction tests.	3
5. Dust suppression using electrostatic mist equipment.	9
6. Non-destructive testing (NDT) system for concrete shaft linings in potash mines.	9
7. Prototype construction and trial of development bridge conveyor in a potash mine	5
8. Development of potash mine clay seam sensing equipment.	10
Victor Ong, Rock Mechanics Engineer Tel: (306) 933-8554	
1. Development of 2D and 3D numerical modelling programs.	10

2. Tri-axial creep testing of potash ore from Saskatchewan mines. 10

Gordon Phillips, Senior Geological Engineer
Tel: (306) 933-8569 Fax: (306) 652-2699

1. Development of gravity and magnetic survey systems to map basement rock structures. 10

2. Application of geotomographic imaging in potash mining. 10

3. Application of radar technology to in-seam geophysics in potash mining. 10

Terry Danyluk, Mine Geologist
Tel: (306) 933-8568 Fax: (306) 652-2699

1. Development of 3-dimensional seismic reflection techniques to survey prospective ore panels. 10, 6

2. Surface photo-lineament studies as an aid to identifying sub-surface geology. 1

3. Geochemistry of potash and brines. 10

Arnfinn Prugger, Geophysics Engineer
Tel: (306) 933-8682 Fax: (306) 652-2699

1. Development of micro-seismic monitoring systems. 10

Smoky River Coal Limited
P.O. Box 2000
GRANDE CACHE, AB,
T0E 0Y0

Horst H. Sandkuhler
Manager, Underground Mines
Tel: (403) 827-3711
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Thick seam underground coal mining demonstration project.	2, 4

Tantalum Mining Corporation
of Canada Limited
P.O. Box 2000
LAC DU BONNET, MB,
R0E 1A0

R.A. Simard
Mine Superintendent
Tel: (204) 345-8658
Fax: (204) 345-8879

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Stress analysis resulting from pillar reduction in room and pillar mining; used to establish new pillar pattern.	7,10
2. Comparative button bit studies to determine the most appropriate $1\frac{3}{4}$ inch rock bit for spodumene ore.	5, 7
3. Pillar reduction techniques utilizing long-hole-drill jumbo.	7,10

Algoma Steel Corporation Ltd.,
Algoma Ore Division
George W. MacLeod Mine,
WAWA, ON,
P0S 1K0

A.L. Stevens
Mine Manager
Tel: (705) 856-4620
Fax: (705) 856-7006

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computerized tracking of mine ores and grades.	4,11

Denison Mines Ltd.,
Elliot Lake Operations,
Box B-2600,
ELLIOT LAKE, ON,
P5A 2K2

S. Sandanayake
Construction/Industrial
Engineer
Tel: (705) 848-9111
Fax: (705) 848-5814

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Testing methods for mining, drying and conveying high grade fines recovered from sumps.	5, 8
2. Use of consolidated fills for controlling violent pillar failures.	10
3. Use of microseismic instrumentation to monitor pillar stability.	10
4. Research into low profile mining in Jackleg stopes involving mechanized Jackleg mining and mobile slushers.	5, 6
5. Investigation into in situ leaching of fines.	12
6. Examination of Upper Reef (seam mining) Jumbo mining methods in areas where Lower Reef voids would be filled with consolidated fill.	4, 6
7. Investigation of various methods to reduce energy consumption.	5

Domtar Chemical Group
Sifto Salt Division
Goderich Mine
North Harbour Road
P.O. Box 370
GODERICH, ON
N7A 4C6

Denis Bray
Manager Maintenance,
Planning & Eng.
Tel: (519) 524-8351
Fax: (519) 524-6918

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE

Gorden Bull, Mine Engineer
Tel: (519) 524-8351 Fax: (519) 524-6918

1. Mine modelling incorporating gas pressure statistics obtained by computerized monitoring of the overlying mine strata. 10,11

2. Pillar shielding experiment to reduce scaling requirements 10

Domtar Gypsum
3310 South Service Road,
P.O. Box 1128, Station 'B'
BURLINGTON, ON
L7N 3M6

R.C. Hartviksen
Manager Engineering
Tel: (416) 333-2200
Fax: (416) 333-2227

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design and selection of cutter bit and bit spacing on the cutter head.	7, 5

Falconbridge Limited,
Kidd Creek Division
P.O. Box 2002
TIMMINS, ON,
P4N 7K1

Dr. Thiann R. Yu
Chief Engineer,
R & D Productivity
Tel: (705) 267-8787
Fax: (705) 267-8709

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Loose rock sensing system for mechanized scaling.	5,11
2. Pozzolanic property of Cu ground slag.	10
3. Improvement of underground radio communications.	1,11
4. Hang-up relief techniques for drawpoints and ore passes.	5
5. Installation of a mine-wide microseismic system.	5,10
6. Ground support for drifts passing through cemented rockfill.	10
7. Post consolidation of stope fill.	6,10
8. Establishment of a compressed air reservoir underground.	4, 7
9. Installation of a remote controlled rockbreaker.	5

Falconbridge Ltd.,
ONAPING, ON,
P0M 2R0

H.A. (Bert) Smith
Mine Engineer, Research
and Development
Tel: (705) 966-3411
Fax: (705) 966-2350

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Improving productivities in cut-and-fill stopes through mechanized bolting and scaling.	5, 7
2. Use of paste fills and other high modulus fills, state-of-the-art studies in progress.	10,11
3. Microseismic monitoring systems; installed at all Falconbridge mines and linked to a central control room for continuous 24-hour monitoring.	10,11
4. Rockburst studies at Strathcona Mine jointly with MRD, with emphasis on fault slip behaviour.	10
5. Development of 2-D and 3-D numerical modelling programs using the Distinct Element Approach.	10,11
6. Computer-aided design for optimum mine planning.	4,11
7. Trials with a mechanized scaling machine and a mechanized bolter/screener.	5
8. Establishing a central control room at Strathcona for hoists and other materials handling functions.	8, 9
9. Blind boring raises with cluster drill heads.	5, 6
10. Guidance systems for underground vehicles.	2

11. Measuring levels of materials in ore and waste passes using radio imaging technology. 8

12. Developing data bank and understanding of fault slip rockbursts using full seismic waverform analysis, 2 and 3D modelling and tomographic imaging. 4,10

13. Developing stability graph approach to design post pillar cut-and-full stopes. 4,10

14. Development and testing of compact underground hard rock boring machine (CUB). 6

15. Joint research project with CANMET on the development of Expert System Modules for cut-and-fill Mining. 6

Hemlo Gold Mines Inc,
Golden Giant Mine
P.O. Box 40
MARATHON, ON,
P0T 2E0

Bill Hrastovich
Rock Mechanics Engineer
Tel: (807) 238-1121
Fax: (807) 238-1013

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Microseismic system installation and monitoring at the Golden Giant Mine.	10,11
2. Installation and operation of Local Area Network (LAN tastic), linking engineering, geology and peripheral (service) data acquisition and microseismic processing computer systems.	11

Inco Limited
Ontario Division
COPPER CLIFF, ON,
P0M 1N0

J.W. Loring
Manager Mines Research
Tel: (705) 682-5261
Fax: (705) 682-6842

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Testing of "double-decked" crater blasting techniques.	7
2. Microseismic monitoring programs.	10,11
3. Development of a 3-D numerical modelling system for rock mechanics.	10,11
4. Jointly developing, with Spar Aerospace, remote controlled underground equipment to screen and bolt in recently blasted areas.	5,11
5. High density fill.	8,10
6. 70 ton electric automated haulage truck.	5
7. Development of equipment for underground shaft drilling.	5, 6

Lac Minerals Limited,
Macassa Division,
P.O. Box 550,
KIRKLAND LAKE, ON,
P2N 3J7

E.N. Nelson
Area Engineer,
Tel: (705) 567-5208
Fax: (705) 576-5736

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mine monitoring and control system for pumps, fans and heating system.	11, 9
2. Tailings reclamation using dredging and dry excavation.	3,12
3. Use of microseismic system to monitor rockbursts.	10,11
4. Posts in timbered drifts replaced with cable slings.	10, 2
5. Longhole mining in narrow veins.	7
6. Recovery of heat from waste mine water and compressors to preheat mine ventilation intake air.	9
7. Cemented rockfill.	10
8. Auxiliary ventilation with centrifugal fans.	9
9. Introduction of small capacity LHD equipment into narrow vein track mining operations.	5, 8
10. Raise boring in highly stressed ground.	6,10
11. An effluent treatment plant for a 1250 ton-per-day gold mill completed and running since April 1989.	3
12. Steep, narrow vein mining initiated from an Alimak Raise.	6

Mattabi Mines Ltd.,
Lyon Lake Division,
P.O. Box 190
IGNACE, ON,
P0T 1T0

Richard Samson
Mine Superintendent
Tel: (807) 934-2291
Fax: (807) 934-2291

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of camera-linked receiver/transmitter systems for operating and retrieving remotely operated scoops (LHDs).	6,11

Mining Industry Technology
Council of Canada (MITEC)
Suite 1105, 350 Sparks street
OTTAWA, ON,
K1R 7S8

W.G. Jeffery
Executive Director
Tel: (613) 233-9835
Fax: (613) 233-8897

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Identification of new and innovative mining machinery.	5
2. Evaluate Anomalous In-Situ Stress Conditions and Their Effect on Mine Design.	4
3. PCDEP/PCSIM Software package development for the economic evaluation of ore deposits. The software will encompass, cost, taxation and revenue options available to exploration and mining companies.	2, 4

Noranda Minerals Inc.,
Geco Division,
P.O. Box 100,
MANITOUWADGE, ON,
P0T 2C0

B. Anderson
Chief Mine Engineer
Tel: (807) 826-3211
Fax: (807) 826-4110

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Research on causes, effects and prevention of sulphide dust explosions.	1, 9
2. Investigating the various methods of loading wet blastholes with non-water-resistant ANFO. (Kent MacNeill, Snr. Blasthole Tech.)	5, 7
3. Investigate difference in ground disturbance caused by various blasting sequences, as measured by vibration monitor. (Kent MacNeill, Snr. Blasthole Tech.)	7,10
4. Investigation of the ways to move ANFO horizontally without using compressed air as a motive force. (Ken Culhane, Planning & Electrical Eng.).	7, 8
5. Development of blasthole layout pattern software such as AUTOLISP and AUTOCAD programs. (L. Kneen & W. Harris - Survey/Blasting group.)	7, 9
6. Development of engineering controls for environmental noise attenuation and personal hearing protection. (Lester Kneen, Chief surveyor).	1, 5
7. Development of an electronic survey notebook that can be coupled to a computer to prepare mine survey results and implement plotting. (Lester Kneen, Chief Surveyor).	9,11
8. Development of computer programs to monitor exposure of workers to various specified environmental toxic pollutants. (L. Gotz Environmental Engineer)	1, 9

9. Investigation of blasting system using light generated energy to initiate blast - Photodet system. (Kent MacNeill - Snr. Blast. Tech.) 7,11

10. Ground control closure phenomena - station monitoring. 10

11. Control of underground ventilation fans using a surface located personal computer system. (P. Donaldson, G. Noroshelo)

William Harris, Blasthole Technician
Tel: (807) 826-3211 Fax: (807) 826-4110

1. Development of slot raises using single, large diameter longholes. 4, 7

2. Blasting technology software program for use with blasthole stoping. 7,11

3. Developing a blasthole stoping system using 170 ft. vertical lifts without intermediale levels. 4, 7

Kent MacNeil, Senior Blasthole Technician
Tel: (807) 826-3211 Fax: (807) 826-4110

1. Photo-Det blast initiation using light-generated energy. Field testing and development of additional hardware. 7,11

Denis Blier, Senior Research Contracts Analyst
Tel: (807) 826-3211 Fax: (807) 826-4110

1. Evaluation and trials of solid rubber tires for u/g trackless equipment. 5, 7

2. Shortcrete research - dry process shotcreting for ground support and airflow improvement purposes. 5,10

Placer Dome Inc.,
Dome Mine,
Box 70,
SOUTH PORCUPINE, ON,
P0N 1H0

D. Shultz
Acting Chief Engineer
Tel: (705) 235-3221
Fax: (705) 235-2343

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Feasibility study for rehabilitation of Paymaster Orebody.	2
2. Computerization of ventilation surveys.	1, 9

Placer Dome Inc.,
Campbell Mine,
P.O. Box 10,
BALMERTOWN, ON,
P0V 1C0

Gordon Reid
Chief Engineer,
Tel: (807) 735-2075
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Investigation of microseismic data to determine the mechanics of rockbursts at Campbell Mine and to refine computer model.	10,11
2. Implementation of mine-wide underground radio communication system.	1, 5
3. Evaluation of backfill as support in rockburst-prone areas by installing and monitoring suitable instrumentation.	10
4. Design of longhole mining methods for use in highly stressed and rockburst-prone crown pillars.	10, 4

Placer Dome Inc.,
Detour Lake Mine
130 Wilson Ave.,
TIMMINS, ON,
P4N 2S9

T. Byberg
Underground Production
Superintendent
Tel: (705) 268-3333
Fax: (705) 264-4038

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Paul Batten, Mine Maintenance Superintendent Tel: (705) 245-3211 Fax: (705) 245-3229	
1. Mine radio system - leaky feeder technology.	1,11
2. Hoisting - skipping automation.	8
3. Backfill automation.	5,10
4. Energy monitoring system - load shedding.	9
Jack MacRory, Chief Engineer Tel: (705) 245-3211	
1. Large-scale mechanized cut-and-fill stoping.	7, 8
2. Narrow vein longhole stoping with remote mucking.	7, 8
3. The use of large diameter culverts for vehicle access through backfill.	6, 8
4. A push-pull ventilation system utilizing centrifugal fans.	9
5. The use of consolidated alluvial sand for sill pillar removal.	10
6. Automated surface to underground fuel delivery system.	9

Renabie Gold Mines Ltd.
P.O. Box 65
MISSANABIE, ON
P0M 2H0

Michel Detharet
Chief Engineer
Tel: (705) 234-2333
Fax: (705) 234-2253

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. In situ performances comparison between sub-level caving and shrinking method for the mining of the East Lens deposit.	2, 7
2. Economic of a one arm hydro-electric jumbo in decline and level drifting.	6
3. Reassessment of cutting factor according to geological areas, and relevant modification of reserves.	4
4. Improvement of the mine ventilation through the use of old ore and waste jass to supplement a restricted ventilation raise.	4, 9

Rio Algom Limited
Elliot Lake Operations
P.O. Box 1500
ELLIOT LAKE, ON,
P5A 2K1

S.N. Muppalaneni
Supt. Mining Services
Tel: (705) 461-4325
Fax: (705) 461-4429

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Trials and evaluation of fracturing and in situ bacterial leaching of sub marginal uranium ore; ie. not in ore reserves.	2, 7

Williams Operating Cooperation,
Williams Mine
P.O. Bag 500
MARATHON, ON,
P0T 2E0

Stewart T. Brown, P. Eng.,
Chief Mine Engineer,
Tel: (807) 238-1100
Fax: (807) 238-1050

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Upgrade and automate a surface cement slurry plant to facilitate one man control.	8
2. Install and commission u/g radio communications system.	1
3. Install and commission a high-pressure pumping system for the handling of underground slimes (from sumps and settlers).	9
4. Test trials of new underground bulk explosives handling vehicle.	5
5. Design, install and commission an underground bulk lubricants handling system.	8
6. Installation and commissioning of a gyratory crusher and screen plant for production of crushed rock backfill.	8
7. Flyash substitution for cemented rock fill; 3% cement and 2% flyash to bind a minus 6 inch crushed rock backfill.	7
8. Design, install and commission an automatic monitoring system for major underground fixed equipment c/w centralized PLC control.	9
9. In situ stress monitoring program utilizing IRAD gauges to monitor changes in stress fields in secondary stopes as a result of ongoing primary mining.	10

Aur Resources Inc.
Les Resources Aur Inc.
Division Kierens
B.G. 105-3, R.R. No.2,
VAL D'OR, PQ
J9P 4N7

Keith Boyle
Superintendant of Engineering
Tel: (819) 738-5435
Fax: (819) 738-5624

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Feasibility study of Norlartic Project.	2
2. Gold Hawk backfill plant.	10

Cambior Inc.
Division Siège social
1075, 3ème avenue est
VAL D'OR, PQ
J9P 6M1

Richard Leclerc
Directeur, Ingénierie minière
Tel: (819) 825-0342
Fax: (819) 825-0211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design of a control system to accommodate flexible costs and permit steady operational progress.	1
2. Design of guidelines in a manual form for the primary evaluation of exploration properties or mine sites.	2

Cambior Inc.
Mine Pierre Beauchemin
1075, 3ième avenue est
VAL D'OR, PQ,
J9P 6N1

Robert Marchand
Chef ingénieur
Tel: (819) 825-0211
Fax: (819) 825-0342

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computer aided design to optimize mine planning operations.	11
2. Development of mining methods suitable for an ore body of intermediate dip.	7

JM Asbestos Inc.,
C.P. 1500
ASBESTOS, PQ,
J1T 3N2

Denis N. Roy
Ingénieur-en-chef des opérations
Tel: (819) 879-5431
Fax: (819) 879-2659

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Rock bolting open pit walls.	10
2. Remote control of primary crusher operation.	11,12
3. Measurement of vertical movement on a bench by hydrostatic levelling equipment.	4,10
4. Remote surveillance of mine plant entrances.	1, 9
5. Programmable controller for packaging operation.	12
6. Statistical study of quality control.	12
7. Automation of inclinometer readings and records.	10,11
8. Surveying ground water conditions in and around an ore body.	3
9. Design of inclinometers that are highly resistant to deformation in situ operating conditions.	10
10. Programmable controllers for use with shuttle conveyor systems.	12
11. Strategic evaluation of the options available for managing asbestos tailings.	8, 3

LAB Chrysotile,Inc.,
835, Mooney,
C.P. 459,
THETFORD MINES, PQ,
G6G 5T5

Gaston Verreault
Vice-président
Tel: (418) 338-7500
Fax: (613) 995-3456

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE

Robert Gale, Directeur, ingénierie d'usinage,
Tel: (418) 338-7500

1. Study for computerized inventory control. 1, 8

Pierre Laroche, Directeur, contrôle de la qualité
Tel: (418) 338-7500

1. Development of alternative grading categories for chrysotile asbestos. 1, 12

2. Automation of asbestos fibre quality control in the mill. 12

Les Services TMG (Mine Niobec) inc.
3400, chemin du Columbium
ST-HONORÉ, MARTEL, PQ,
G0V 1L0

Michel Robinson
Directeur
Tel: (418) 673-4694
Fax: (418) 673-3179

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Use of robotics to control ventilation air losses.	9,11
2. Feasibility of using mine waste as backfill material.	2,10
3. Continued monitoring of stresses in stope C-102-17.	10

Les Mines Selbaie,
Case Postale 370,
JOUTEL, PQ,
J0Y 1N0

Denis Caron
Ingénieur-en-chef
Tel: (819) 756-2491
Fax: (819) 756-2298

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Surface crown pillar recovery by controlled caving of overburden.	7,10
2. Optimization of perimeter blasting along the final pit walls to minimize overbreak, by using different drilling and blasting techniques.	10
3. Monitoring stability of open pit walls using wild TC2000 survey instrumentation.	10
4. Monitoring the general stability of zone A-2 (underground) and zone A-1 (open pit), by using 2-D and possibly 3-D modeling programs to check ground movement in horizontal, vertical and crown pillars.	10
5. Monitoring of the crown pillar between zone A-1 and A-2 as well as some vertical pillars in lenses 2 and 3 of zone A-2.	10
6. Vibration monitoring using a seismograph Omniprobe 1200 during production blasting and raise blasting in zone A-2, to establish a criterion for damage to the hanging wall. (AMIRA)	5, 10

Luc Duval, Surintendant concentrateur
Tel: (819) 756-2491 Fax: (819) 756-2298

1. Detailed study of crushing and grinding and the establishment of suitable parameters. Study in conjunction with McGill University and industry participants.	12
2. El potential use in Cu/Zn separation.	11,12

3. Use of column flotation to upgrade final concentrates. 12

4. Optimization of the zinc flotation circuit. 11, 12

Gérard Begin, Planificateur en chef,
Tel: (819) 756-2491 Fax: (819) 756-2298

1. Design and implementation of a computerized preventative maintenance program. 5,11

Jean-Jacques Bouillon, Géologue en chef
Tel: (819) 756-2491 Fax: (819) 756-2298

1. Characterization and structural study of an underground complex ore body (Zone A-2-1). 4

2. Mineral identification and chronological determination mineralization in the mining zone. 7

Minéraux Noranda Inc.,
Division Matagami,
MATAGAMI, PQ,
J0Y 2A0

Régis Paré
Ingénieur de projet
Tel: (819) 739-2511
Fax: (819) 739-3774

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Automation load-haul-dump (LHD) cycle for front-end loader equipment.	5, 8

Richard Tremblay, Métallurgiste de recherche
Tel: (819) 739-2511

1. Column flotation trials to optimize recovery and grade of concent rates.	12

Minerais LAC Limitée,
Division Bousquet,
C.P. 1180,
MALARTIC, PQ,
J0Y 1Z0

Luc Pacquette
Surintendant sous-terre,
Tel: (819) 759-3681
Fax: (819) 759-3663

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Testing a new pattern for installing cemented cable bolts (parrallel or mandolin cable bolting pattern).	10

Minnova Inc.
Division Opémiska
C.P. 10
CHAPAIS, PQ,
G0W 1H0

Jean-Marie Couture
Surintendant général,
Tel: (418) 745-2501
Fax: (418) 745-3129

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Feasibility and use of remote-controlled CAVO 310 and 320 loaders.	5,11
2. Statistical study of the distribution of mineral samples (Au) in draw points.	3, 8
3. Work related health and safety studies.	1
4. Vibration studies using jackleg drills.	5, 7
5. Monitoring particle velocity (vibration) during the mining of surface crown pillar stopes using 6.5 in diameter long holes.	3, 7

Minnova Inc.,
Division Lac Dufault,
C.P. 2000
NORANDA, PQ,
J9X 5B4

Louis Forget
Ingénieur-en-chef
Tel: (819) 797-2501
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Implementation of a rock mechanics program to determine the method of mining an ore body located at great depth.	10
2. Computerization of mine planning tasks such as mine design, surveying, blasting, ventilation and production statistics.	9,11
3. Computerization of bonus system.	9,11
4. Research focussed on the phenomena of soft inclusions in host rocks.	10
5. Studying the potential for rockbursts in deep mines.	10
6. Implementation of a rock mechanics program as an aid to determining stope dimensions in deep-seated ore bodies.	10, 7

Minnova inc.
Division Lac Shortt
C.P. 539
CHAPAIS, PQ,
G0W 1H0

Jean-Luc Chouinard
Ingénieur-en-chef
Tel: (819) 753-2571
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Implementation of a 3-D software package for drilling and blasting.	7, 4
2. Introduction of the AVOCA mining method.	7
3. Computerization of bonus pay schemes, phase II.	1
4. Study of crown pillar recovery technology.	10
5. Implementation of a micro-seismic monitoring system.	10, 11
6. Study of alternative methods for mining the 500-525 sill pillar and the selection of monitoring and control equipment.	10, 7
7. Introduction of T.V. cameras for remote control of operations at ore drawpoints.	11, 6
8. Computer assisted mine design program development.	4, 7
9. Study of alternative mining methods for use in narrow vein mining operations.	2, 7

Placer Dome Inc.
Les Mines Sigma (Québec) Ltée.,
300, 3ième avenue est
VAL D'OR, PQ,
J9P 4N8

Christian Pichette
Ingénieur-en-chef,
Tel: (819) 825-4182
Fax: (819) 825-8476

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Experimental use of steel arches and pre-fabricated steel chutes in cut-and-fill mining operations.	7,10
2. Developing mining sequences for exploiting ore reserves located in a part of the mine subject to rockbursts.	4
3. Computerization of survey calculations and bonus system.	9

Placer Dome Inc.,
Mine Kiena,
C.P. 9000,
VAL D'OR, PQ,
J9P 6A5

Martial Tremblay
Ingénieur-en-chef
Tel: (819) 738-4031
Fax: (819) 738-5452

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Communication systems for underground workers.	1
2. Simulation of ventilation networks on micro-computers.	9,11
3. Computerized surveying system using CAD system to update mine plan.	9,11
4. Programmable controller for peak control.	9,11
5. Software aided mine design - mine planning.	9,11
6. Tunnel boring studies and evaluation.	11

QIT-Fer et Titane Inc.,
Mine Tio,
C.P. 160
HAVRE ST-PIERRE, PQ,
G0G 1P0

René Scherrer
Ingénieur minier junior
Tel: (418) 538-2400
Fax: (418) 538-2983

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Installation and calibration of two mineral analysis devices.	5,11
2. Installation of piezometers to monitor the water table levels in relation to final pit walls/slopes.	3,10
3. Design of inventory software programs.	4,11
4. Design of software programs facilitating the use of basic mine information (surveys and drill logs directly on PC-Mine and AUTOCAD hardware.	4,11
5. Computerization of aerial photography program results and mine plans using AUTOCAD-II software, in order to facilitate mine planning projects.	4,11

Brunswick Mining
and Smelting Corporation Ltd.
Mining Division
P.O. Box 3000
BATHURST, NB,
E2A 3Z8

Robert B. Fisher
Senior Planning Supervisor
Tel: (506) 546-6671
Fax: (506) 548-8379

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. 3D mine geology modelling.	11
2. Implementation of automatic controlled fans and regulators. (D. Petrie)	9
3. Electronic surveying. (Gord Graham)	11
4. Blasthole drilling layout by computer. (Gord Graham)	11

Jim Schnarr, Mine Manager
Tel: (506) 546-6671 Fax: (506) 548-8379

1. Managing for Consistency training courses, as part of a continuous management improvement strategy.	1
2. Implementation of quality management in mining applications.	1

Gord Graham, Mining Engineer
Tel: (506) 546-6671 Fax: (506) 548-8379

1. Electronic surveying.	11
2. Blasthole drilling layout by computer. (Gord Graham)	11
3. Computer Blast Modelling.	11

Heath Steele Mines
A division of Brunswick
Mining & Smelting Corp. Ltd.
P.O. Box 400
NEWCASTLE, NB,
E1V 3M5

J. Martin
Mine Manager
Tel: (506) 622-2100
Fax: (506) 622-6576

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Heath Steele Waste Rock Study - three phases.	2, 6

Claude Ferron, Cencentrator Superintendent
Tel: (506) 622-2100 Fax: (506) 622-6576

1. Lysimeter tests on tailings.	12

Potash Company of America
Division of Rio Algom Limited
P.O. Box 1489,
SUSSEX, NB,
E0E 1P0

Brian Roulston
Supervisor of Geotechnical
Services
Tel: (506) 433-5445
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Monitoring of consolidation in waste salt backfill.	10, 11
2. Investigate the geotechnical feasibility of developing an injection well in the Moncton sub-basin for disposal of excess brine from the potash milling operation.	3
3. The study and predictive modelling of subsidence induced by potash mining.	10, 3
4. The study of hanging wall support by improved tight fill.	7, 8

University of British Columbia,
Dept. Mining and Mineral
Process Engineering,
6350, Stores Road,
VANCOUVER, BC,
V6T 1W5

A.L. Mular
Professor and Head, MMPE,
Tel: (604) 228-3983
Fax: (604) 228-5599

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computer program for estimating capital and operating costs, and update of CIM special volume.	2,11

Dr. Allan E. Hall, Mining Professor
Tel: (604) 228-6294 Fax:

1. Recirculation of mine ventilation air in order to decrease heating costs and increase face velocities.	9
2. Examination of sulphide dust explosions in Canadian mines.	1, 9
3. Development of PNET program for project scheduling.	1, 4
4. Mine ventilation network analysis using spread sheet programs.	9

C.O. Brawner, Professor - MMPE
Tel: (604) 228-3986 Fax: (604) 228-5599

1. Pillar strengthening with grouted, untensioned rebar or rockbolts.	10

Dr. R. Pakalnis, Assistant Professor
Tel: (604) 228-3988 Fax: (604) 228-5599

1. Development of a fibrel/glass/polymer cable bolt. 10

2. Mine design within a post-yield environment. 10

Dr. Alastair J. Sinclair, Professor & Head Geological Sciences
Tel: (604) 228-2804 Fax: (604) 228-6088

1. A microcomputer - based approach to geostatistical ore reserve estimation. 4, 2

2. Comparative ore reserve estimates of precious metal deposits in British Columbia. 2

Dr. C.I. Godwin, Professor
Tel: (604) 228-2804 Fax: (604) 228-6088

1. Ore deposit modelling at the French Mine, Hedley Au-Camp, South - Central B.C.. 2

2. Distribution of gold and associated alteration minerals, Mount Milligan Porphyry Gold deposit, North - Central B.C.. 2

3. S - Isotopes of Barite: dating of volcanogenic deposits and discrimination of Ve in - Types from Stratiform Types. 2

4. Application of galena - lead isotopes in exploration on the Canadian Cordillera. 2

University of Alberta
Department of Mining,
Metallurgical and Petroleum Engineering
606, Chemical-Mineral Building
EDMONTON, AB,
T6G 2G6

Dr. Ken Barron
Professor of Mining,
Tel: (403) 492-3810
Fax: (403) 492-7219

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Size effects on the triaxial strength of coal.	10
2. Roof stability in coal mines.	4,10
3. Outbursts in coal mines.	4,10
4. Pillar stability in longwall mining.	4,10
5. Failure mechanisms in bedded footwall slopes.	4,10

University of Manitoba
Department of Geological Engineering
314, Engineering Building
WINNIPEG, MB,
R3T 2N2

Brian Stimpson
Professor and Head of Dept.,
Tel: (204) 474-8270
Fax:

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. A concept for a low cost stress change meter.	10
2. Failure of thick mine roofs in layered, massive rock.	10
3. Mine Potash stability.	10
4. Effect of corrosion on pull-out strength of split sets.	10

University of Saskatchewan
Department of Geological Sciences
SASKATOON, SK,
S7N 0W0

Dr. D.J. Gendzwill
Professor of Geophysics,
Tel: (306) 966-5693
Fax: (306) 966-8593

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Natural and induced seismicity in Saskatchewan.	10
2. Three dimensional (3-D) seismic reflection surveys from surface for use in potash mine planning exercises.	10
3. Electromagnetic sounding system for strata control in potash mines.	10
4. Seismicity and geophysical engineering in potash mines.	3,10
5. Consideration of the glacial and/or regional thrust structures when designing highway cuttings in Saskatchewan.	10
6. Study of faults and jointing in relationship to open pit coal mining operations in southern Saskatchewan.	10

Dr. D. Stead, Associate Professor
Tel: (306) 966-5714 Fax: (306) 966-8593

1. Study of fracture mechanisms in rocks using ultrasonics, electron microscopy and mathematical modelling techniques.	10
2. A physical properties database for the potash industry.	10
3. Borehole acoustic logging around underground potash mine openings.	10
4. Slope stability studies in Southern Saskatchewan.	10, 3

5. The factors affecting slope stability in surface coal mines. 10, 3

Dr. Malcolm Reeves, Professor, Geological Engineering
Tel: (306) 966-5703

1. Investigation of the permeability structure of potash tailings piles. 3
2. Compilation of a database of physical properties of salt, potash and associated rock types. 11
3. Discrimination between potash ores using remotely-sensed images in the visible spectrum 11
4. Evaluating the potential of the Deadwood-Winnipeg and interlake formations for the disposal of postash brines. 3

Mr. E.A. Ripley, Crop Science and Plant Ecology
Tel: (306) 966-4944 Fax: (306) 966-5015

1. Environmental impact on mining in Canada. 1

Lakehead University
School of Engineering
955 Oliver Road
THUNDER BAY, ON,
P7B 5E1

Dr. J.G. Locker
Director
Tel: (807) 343-8110
Fax: (807) 343-8023

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Dr. Inder Nirdosh, Professor Tel: (807) 343-8343	
1. Processes for obtaining environmentally safe uranium mill tailings.	3,12
Henry North, Professor, Mechanical Engineering, Tel: (807) 343-8560	
1. Low frequency cavitation processing.	11
2. Resonance grinding.	11
3. Sonic drill - use of high-frequency, mechanical oscillation to achieve faster drilling rates.	3, 7
Dr. H.T. Saliba, Associate Professor Tel: (807) 345-2121	
1. Development of software modelling program and construction of physical laboratory scale model to investigate and analyse vibration in mine hoisting systems.	9
Mr. Rao Puttagunta, Professor Tel: (807) 343-8573	
1. Hydraulic jet mining method for the recovery of bitumen from Canadian oil sands.	5,12

Laurentian University,
Centre for Mining and Mineral
Exploration Research (CIMMER)
Ramsey Lake Road,
SUDBURY, ON,
P3E 2C6

Dr. G. Courtin
Director CIMMER
Tel: (705) 675-1151
Fax: (705) 673-6532

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Dr. D.E. Goldsack, Dean of Sciences and Engineering, Tel: (705) 675-1151	
1. Chemo-abrasive water jet cutting of rocks.	5,11
2. Studies on densified backfill material.	10
Dr. Michael L. Jeremic, Professor Tel: (705) 675-1151	
1. Ground de-stressing by camouflet blasting.	10
2. Stability analysis of rock salt mines - conventional underground and solution mining.	10
3. Small scale mining in south-east Asia.	10
Dr. Laxman M. Amaratunga, Professor Tel: (705) 675-1151	
1. Study of sulphide dust explosions in Canadian mines - a fine particle approach.	1, 9
2. Agglomeration of fine mill tailings for backfill and use as coarse aggregates.	12,10

3. Fine mill tailings for underground backfill as a supplementary fill material. 10,12

Dr. A. Farah, Professor
Tel: (705) 675-1151

1. Resin/cement grouted bolts in underground mining. 4,10
2. Studies on densified backfill material (fly ash). 10

Dr. S.P. Singh, Associate Professor
Tel: (705) 675-1151

1. Guidelines to controlled blasting underground using small diameter blast holes. 7, 10
2. Cuttability and abrasiveness of hard rocks. 10
3. Classification of mine workings according to their burst proneness. 10

Dr. Shailendra K. Sharan, Professor
Tel: (705) 675-1151

1. Development of finite element techniques for analyzing underground openings. 10, 11
2. Numerical modelling of blasting and rockbursts for mine design purposes. 10, 11

Mr. David Goforth, Lecturer
Tel: (705) 675-1151

1. Educational materials on the mining industry. 11, 9

Mr. K.R. Bonin, Director of the Library
Tel: (705) 673-6595

1. Mining environment database in the subject areas of abandoned Mines and land reclamation. 1

2. Database of materials supporting research into the control of Acid Mine Drainage. 3

Dr. V. Appanna, Assistant Professor
Tel: (705) 675-1151

1. Bioremediation: soil microbes in metal pollution control. 6,11

2. Microbes in biogeochemical cycles of metals. 6,11

Dr. M.A. Persinger, Professor,
Tel: (705) 675-1151

1. Monitoring and analysis of seismic events in the Sudbury Basin for use in correlating rockburst phemonena with mining operations and prediction of risk of rockbursts. 10

2. Using luminous phenomena to predict tectonic strain regions in North America; determination of relationship between forced fluid injection and patterns of strain release. 10

Dr. F.W. Clulow, Research Specialist
Tel: (705) 675-1151. Fax: (705) 673-6508

1. Radionuclide transfer from mother to offspring. 3

2. Radionuclide transfer in ecosystems containing uranium mine tailings. 3

3. Radionuclide uptake by children living near uranium mine tailings. 3

Dr. G. Rubin, M. Leach & A. Patitsas Department of Physics
Tel: (705) 675-1151

1. The acoustics of granulated materials. 10,11

2. Hard rock fragmentation using sonic and ultrasonic resonance. 11

3. Acoustic emission spectral analysis and the study of its application in ground control technology. 10, 11

Dr. K. Westaway, Chemistry Professor
Tel: (705) 675-1151

1. The lifetimes and pathways of the PAHs and mutagens in dieselized underground mines. (Dr. D. Hallman, assoc. researcher.) 1

2. Determination of the nitro PAHs and mutagens generated by the catalytic converters used on underground diesel equipment. 1

Dr. Keith Winterhalder, Associate Professor,
Tel: (705) 675-1151

1. Nitrogen status and nitrogen fixation on acid, metal-contaminated industrial lands before and after revegetation. 3

2. The use of various overburdens and neutralizing materials in revegetating industrial lands before and after revegetation. 3

3. The potential of direct incorporation of revegetation materials at the final stage of spigotting TTD (Thickened Tailings Disposal) tailings. 3

Dr. Lloyd D. Reed, Professor of Physics
Tel: (705) 675-1151

1. Investigation of light-charged particles emitted by rocks during fracture. 10, 2

Laurentian University,
Geomechanics Research Centre,
Ramsey Lake Road
SUDBURY, ON
P3E 2C6

Dr. Peter K. Kaiser
Professor/Director
Tel: (705) 673-6517
Fax: (705) 673-6532

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Numerical modelling of ground response to excavation.	10
2. In situ stress measurement data analysis for nuclear waste repository.	10
3. Hard rock tunnel boring machine evaluation.	4, 5
4. Fault slip rockburst study.	10
5. Microseismic Source Location Evaluation.	10
6. Hard rock support design.	10
7. Cable bolt performance monitoring.	10
8. Support in bursting ground.	10

Queen's University
Department of Mining Engineering
Goodwin Hall
KINGSTON, ON,
K7L 3N6

Dr. Peter Calder
Professor
Tel: (613) 545-2196
Fax: (613) 545-6597

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Pit slope stability studies, rock mass reinforcement.	4,10
2. Control blasting.	7,10
3. Open pit simulation studies.	2, 4
4. Microseismic emissions related to stress transfer in hard rock mines.	10
5. Computerized open pit feasibility and design.	2, 4

John G. Paterson, Professor
Tel: (613) 545-2207

1. Activated carbon losses in carbon-in-pulp (CIP) circuits.	12
2. Treatment of refractory arsenic gold ores by pressure chlorination.	12

Dr. W.F. Bawden, Chair and Professor, Mine design
Tel: (613) 545-6553

1. Development of a design method for the support of underground mining excavations in hard rock.	10,11
2. A study to evaluate the use of Campbell Red Lake Mine microseismic data in mine design.	10,11

3. Evaluation of the application of Mathews Empirical Stope Design technique to Falconbridge post pillar cut-and-fill mining. 10

4. Study on fundamentals of blast damage. 10,11

5. Initial study on the use of full wave form microseismic data in mine design. 10

Dr. James F. Archibald, Associate Professor
Tel: (613) 545-2198

1. Development of microseismic monitoring networks for rockburst precursor detection and rapid in situ stress assessment. 10

2. Long term subsidence prediction in potash extraction operations based on field monitoring, laboratory measurements and computer modelling. 4,10

3. Assessment of quality control paramaters influencing in situ backfill competence. 4,10

4. Use of chemical gelling agents as cement replacement materials in backfills. 4,10

5. Use of total tailings for backfill support. 4, 2

6. Spray-on coatings for underground mine support. 4,10

Garston Blackwell, Associate Professor
Tel: (613) 545-2230 Fax: (613) 545-6597

1. Underground and open pit mine design and planning. 4, 11

2. Mineral inventory estimation and grade control in underground and open pit mining. 3, 4

3. Computer aided mine engineering, geology and surveying, including photogrammetry. 6, 10

4. Application of radio telemetry to slope monitoring and operation of large mining shovels. 7, 10

Euler De Souza, Assistant Professor
Tel: (613) 545-2199 Fax: (613) 545-6597

1. Field performance evaluation of in-the-hole (ITH) dry drilling and dust control technology. 7, 5

2. Long term vibration evaluation of drill handle design. 5, 7

3. A model to predict toxic fumes from explosives and dilution ventilation. 1, 9

4. Development of an automatic data acquisition system to monitor rock deformation. 10,11

5. Numerical modelling of sill pillar extraction operations. 4,10

6. Rock mechanics instrumentation and monitoring of underground operations. 10,11

7. A computer based mine dewatering methodology using expert systems. 4, 7

Dr. P. Katsabanis, Assistant Professor
Tel: (613) 545-2196 Fax: (613) 545-6597

1. Explosive foam initiation modelling. 7

2. Development of a detonation calorimeter. 7

3. Sulphide dust explosion. 7

4. Modelling of non ideal explosives. 7

5. Determination of equation of state parameters for low density and non ideal explosives. 7

W.T. Yen, Associate Professor
Tel: (613) 545-2206 Fax: (613) 545-6597

1. Carbon stripping at ambient temperature and carbon stripping with non-cyanide solution. 11,12

2. Pressure oxidation of refractory gold ore followed by thiourea leaching. 11,12

3. Pressure oxidation of refractory gold ore with sodium hypochlorite. 11,12

4. Carbon and gold loss in the carbon-in-pulp (CIP) and carbon-in-leach (CIL) processes. 12

Alan Green,

1. Firm level productivity measurement for the Ontario metal mining Industry. 1, 2

2. Towards more efficient R&D in the Ontario mineral sector. 2, 4

R.P. Chaykowski

1. Human resource planning and development for the Canadian metal mining industry. 6

Centre for Resource Studies
Queen's University
KINGSTON, ON
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Margot Wojciechowski
Director of CRS
Tel: (613) 545-2553
Fax: (613) 545-6651

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. R&D funding in the mineral Sector.	2, 4

Brian Mackenzie, Senior Research Associate
Tel: (813) 598-9849 Fax: (813) 598-9849

1. Mineral Exploration and development Potential in Manitoba: Guidelines for Policy Formulation.	4
2. PCDEP/PCSIM Software package development for the economic.	2, 4

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Dr. Maurice B. Dusseault
Chairman, Geological
Engineering
Tel: (519) 888-4590
Fax: (519) 888-4654

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of an Expert System for geophysical log interpretation.	6,11
2. Waste management for oil sands mines.	3
3. Properties of geomaterials.	3
4. Sand production in oil wells.	7
5. Use of Halite Process wastes as backfill in potash mines.	10
6. Potash mine design (software)	4
7. Hydraulic fracture in sands and sandstones.	6

Dr. John A. Franklin, Research Professor
Tel: (519) 885-1211 Fax: (519) 888-4654

1. Development of Expert Systems for rock mass classification and design of underground openings.	10, 6

Dr. John A. Cherry,
Tel: (519) 885-1211 Fax: (519) 888-4654

1. INCO Copper Cliff tailings area - Pistol Dam investigations.	3, 6

2. Analysis of the Heath Steele tailings solids. 3, 6

3. Falconbridge Mines Ltd.: Nickel Rim investigations. 3, 6

4. Hydrogeochemical studies and interpretation related to mineralogical studies of sulphide-rich tailings. 3, 6

5. Hydrogeology and geochemistry of the INCO, Copper Cliff mine tailings impoundment. 3, 6

Dr. R.W. Gillham,
Tel: (519) 885-1211 Fax: (519) 888-4654

1. Development of a laboratory procedure for evaluating the effectiveness of reactive tailings covers. 3

Dr. Ronald V. Nicholson,
Tel: (519) 885-1211 Fax: (519) 888-4654

1. Reduction of acid generation in mine tailings through the use of moisture-retaining cover layers as oxygen barriers. 3

2. A Laboratory investigation of the kinetic controls on copper and zinc concentrations in sulphide tailings. 3

E.J. Reardon, Professor, Ph. D. Student
Tel: (519) 885-1211

1. Experimental and chemical modelling studies of mineral/water reactions pertinent to acid mine drainage waters. 9

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Réjean Nadeau
Directeur
Tel: (418) 338-8591
Fax: (418) 338-3498

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Mechanization of mine dump revegetation programs using filter muds/slurries.	4, 5
2. Pre-impregnate with asbestos fibre base.	6

École Polytechnique
Centre canadien d'automatisation
et de robotique minières (CCARM)
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Luc Bélanger
Directeur Général, CCARM,
Tel: (514) 340-4049
Fax: (514) 340-4440

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of a demonstration load-haul-dump (LHD), guided by remote vision controls.	5,11
2. Feasibility study of an automatic guidance system for mine trucks.	5,11
3. Study and development of an underground communications system.	5,11
4. Guidance systems for underground trackless mining vehicles.	5,11
5. Development of a unit for guidance of LHD's by remote vision control.	5,11
6. Drill deviation simulation.	7,11
7. The development of a basic control algorithm for the control of a rotary blasthole drill.	7,11
8. Monitoring investigations of a rotary blasthole drill at Quebec Cartier Mine.	7,11
9. Blasthole trajectory and open stope surveying.	7,11
10. Automated interpretation of monitored drilling performance parameters.	5,11
11. Continuation of research on rotary percussive drilling.	5,11

École Polytechnique,
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Denis E. Gill
Professeur titulaire
Tel: (514) 340-4865
Fax: (514) 340-4477

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Geostatistical characterisation of rocks in the rock mass.	10
2. Historical effects of loading with the convergence - confinement method.	10
3. Indentation tests on the side walls of boreholes.	10
4. Analysis of stability of surface crown pillars.	10
5. Effect of the redistribution of stress around underground mine openings in rock salt strata.	10
6. Mechanical behaviour of salt fines under weak confining stresses.	4,10
7. Effect of the rigidity of rock mass on shear resistance caused by geological discontinuities.	10

Aubertin, Professeur adjoint
Tel: (514) 340-4046

1. Evaluation of the potential for rockbursts in mines.	10
2. Study of post-rupture behaviour of rocks and brittle materials.	10
3. Development of constitutive models for rock salt.	10

4. Extension of a unified viscoplastic model to determine behaviour of ductile and semi-brittle materials (rocks, minerals). 10

5. Effects of mechanical damage on the behaviour of crystalline minerals. 10

6. Geotechnical design of impervious barriers in mine tailings that generate acid and waters. 3

7. Anisotropic effects of the shear resistance of clays on measurements by in situ shear testing. 3

Robert Corthésy, Professeur adjoint
Tel: (514) 340-4555

1. The effects of heterogeneity on the measurement of stress in rocks and concretes. 10

2. Evaluation of the redistribution of stress by measurement of residual deformation. 10

3. Measure and control deep-seated borehole temperatures using the 'Doorstopper' technology. 5,10

4. Modelling stress in nonlinear elastic materials and anisotropes. 10

Robert P. Chapuis, Chercheur,
Tel: (514) 340-4427 Fax: (514) 340-4477

1. Hydraulic - mechanical interaction during in situ permeability tests. 3,11

2. Development of data concerning the hydraulic properties of road aggregates. 3

3. Influence of drill water on ground permeability measurement. 3, 5

4. Determining the significance of permeability data obtained during pumping tests. 3,10

5. Impervious properties of soil-bentonite mixtures (water retention by tailings). 3

6. Anisotropy of the shear resistant clays. 3

7. Hydrogeological mapping of water-bearing risk zones. 3,11

8. Wet barriers for use on tailing areas where acid mine drainage is a problem. 3, 4

9. Relationship of failure envelope with rock classification system. 10

J. Elbrond, Professeur
Tel: (514) 340-4923 Fax: (514) 340-4477

1. Modelling (simulation) of the productivity of single mining machines, man-machine synergism and machine systems. 1

2. Loss of mineral values and dilution by barren material. 7

3. Final underground mining limits; optimization of underground operations. 4

4. Copper and the world market. 2

François Soumis,
Tel: (514) 340-4515 Fax: (514) 340-4463

1. Computerized assignement (dispatch) of haulage trucks in open pit mines. 8,11

2. Sofware program for the optimization of a strip mining operational plan. 3, 7

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Metallurgical Engineering
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Dr. Malcolm J. Scoble
Director of the Mining
Program
Tel: (514) 398-4374
Fax:

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1.	Mine backfill design and performance.	10
2.	Monitoring machine breakage of rock.	5,11
3.	De-stress blasting design.	10
4.	Drilling and blasting automation.	10
5.	Blast fragmentation: prediction, measurement and control over productivity.	4,11
6.	The mechanics of digging in fragmented rock.	5, 7

Dr. J. Peck, Research Associate
Tel: (514) 398-4373

1.	Drill deviation simulation project.	4,11
2.	The development of a basic control algorithm for the control of a rotary blasthole drill.	4, 6
3.	Monitoring investigations of a rotary blasthole at Quebec Cartier Mine.	5, 6
4.	Blasthole trajectory and open stope surveying.	2, 7

5. Pattern recognition techniques applied to monitored drill performance data. 3,11

Dr. R. Dimitrakopoulos, Assistant Professor (special category)
Tel: (514) 398-4374 Fax: (514) 398-7099

1. Developments in geostatistics. 2,11
2. An expert system for geostatistical ore estimation. 2,11
3. Spatiotemporal stochastic models for the processing and analysis of mining environmental data. 11, 6

Dr. F.P. Hassani, Associate Professor
Tel: (514) 398-4377 Fax: (514) 398-6044

1. Rock-support interaction studies. 10
2. Design techniques for steel support in mine tunnels. 4, 5
3. Feasibility and economics of backfilling system. 2,10
4. Technical and economic feasibility of backfilling operation. 2,10
5. Behaviour and properties of paste backfill. 10
6. Design and simulation of backfill transportation system. 10
7. Design of cable bolt patterns for underground excavation. 10
8. Development of shotcrete cable bolting support system. 10
9. Development of composite rock bolt and cable bolt support for surface and underground excavation. 10
10. Design of anchor reinforcement of rock slopes. 4,10

11. Evaluation of stress memory measurement of rocks by Kaiser effect of acoustics. 10

12. Relationship of failure envelope with rock classification system. 10

Yves Lizotte, Adjunct Professor
Tel: (514) 398-4373 Fax: (514) 398-6044

1. A semi-automated truck dispatching system. 8,11

2. Optimization of fragmentation in underground blasthole mining. 7

Dr. Michel L. Bilodeau, Associate Professor
Tel: (514) 398-4382

1. Development of microcomputer software for evaluating new mine investment proposals. 2,11

2. Optimization of mine development and operating variables. 2,11

3. Risk analysis in mining investments. 2,11

4. Simulation of mine development and operating decisions. 2,11

5. Modelling of the aggregate market of the Eastern United States. 2,11

Dr. A.A. Afrouz, Lecturer
Tel: (514) 398-4378 Fax:

1. Gate road supports. 6,10

2. Development of monolithic and semi-monolithic pack materials for soft rock mining and hard rock bulkheads in backfill. 6,10

3. Pillar support mechanisms. 4,10

4.	Ground control.	10
5.	Slope stability and slope reinforcement.	4,10
6.	Cable bolting.	4,10
7.	Rock bolting.	4,10
8.	Backfill.	4,10
9.	Blasting in mines.	4,10
10.	Rock fragmentation.	4, 6

Jeffrey I. Davidson, Lecturer
Tel: (514) 398-4375 Fax: (514) 398-7099

1.	Incorporation of environmental and social-economic criteria into project evaluation techniques.	2, 3
2.	Information system and economics of small-scale mining and mineral processing on technology.	5, 3
3.	Improving the use of mineral based building materials for shelter provision in Africa.	2

Dr. H.S. Mitri, Assistant Professor
Tel: (514) 398-4375 Fax: (514) 398-4890

1.	Design and analysis of underground steel support systems.	4,10
2.	2-D and 3-D numerical modelling of mine excavations.	8
3.	Time-dependant behaviour of rock mass in salt and potash mines.	9
4.	Design analysis of coal mine, underground steel arches.	4

5. Numerical model development using finite and boundary element mehtods. 6

Dr. B. Mohanty, Adjunct Professor
Tel: (514) 398-4373 Fax: (514) 398-7099

1. Modelling fracture processes in blasting. 4, 7

2. Blast monitoring and optimization. 4,11

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G. Archambault
Directeur
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Fax: (418) 545-5012

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Hydrogeology of fault and shear zones in crystalline bedrock.	10
2. Assessment (productivity) of precambrian bedrock aquifers at Burkina Faso.	10
3. Stochastic modelling of spatial distribution of deformation and fracturing in shear zones.	10
4. Experimental and developmental simulation (modelling) of a computer tool for the prediction of the effects of normal stiffness.	10
5. Numerical stochastic and experimental modelling of shear zones, and of inducer fracturing in these zones.	10

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Denis Bois
Directeur
Tel: (819) 762-0971
Fax: (819) 797-4727

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of economic feasibility and technologies for using backfill in underground mines. (J. Lelièvre and J. Ouellet)	2

René Le, Professeur
Tel: (819) 762-0971 Fax: (819) 762-0971

1. Developing human voice control of a video camera mounted on a remote mining machine.	11

Jacques Ouellet
Tel: (819 762-0971 Fax: (819) 797-4727

1. User's guide on techniques for stress measurement in hards rock masses of the Canadian Shield.	10

Jean Lelièvre
Tel: (819) 762-0931 Fax: (819) 797-4727

1. Bioleaching of refractory gold ores.	12

Université Laval
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G1K 7P4

Dr. Pierre Choquet
Professeur en génie minier
Tel: (418) 656-5273
Fax: (418) 656-5343

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of a computer program for the simulation of pulling or drawing ore from stope drawpoints.	7, 8
2. Instrumentation of cable bolts in underground and open pit mines.	10
3. Improvement of subroutine DISCO (solving principal stresses along discontinuity planes) to account for progressive failures, blasting effects and spacing/size of discontinuities.	4,10
4. Mechanics of toppling failure in rock slopes.	10
5. Preparation of a "Technical guide for grouted cable-bolts used as ground support".	4,10
6. Study on the resistance to shearing of rock joints.	10

Jean-Luc Collins, Professeur
Tel: (418) 656-2431 Fax: (418) 656-5343

1. Utilisation of SUN 30 workstation in the teaching of CAD techniques.	4,11
2. The effects of increasing truck size on the future relationship between open-pit and underground mining.	5, 8

Kostas Fytas Professeur
Tel: (418) 656-5057

1. Expert systems.	4,11
2. Optimization of production planning in open pit mines.	4
3. Simulation of shovel-truck operations.	5,11
4. Evaluation of non-parametric geostatistical techniques on the estimation of gold ore reserves (kriging, indicative and probabilistic).	7, 2
5. Simulating mine ventilation systems and comparing with conventional and thermodynamic systems.	2
6. Estimation of underground air resistance (friction or k) factors.	2

Technical University of Nova Scotia,
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Professor, Head of Department
Tel: (902) 420-7708
Fax: (902) 425-1037

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Recovery of gold from Nova Scotia sulphide concentrates.	12
2. Investigation of the charateristics of Little Narrows Gypsum Anhydrite Plasters.	2

Dr. H.A. Hancock, Professor
Tel: (902) 420-7778 Fax: (902) 425-1037

1. Removal of manganese from Wabush iron ores.	12

Dr. D.S. Jones, Associate Professor
Tel: (902) 424-5618 Fax: (902) 425-1037

1. Investigate the use of Nova Scotia produced anhydrite as a monolithic mine support pack material in coal mines.	10

Dr. M.C. Rockwell, Professor
Tel: (902) 420-7696 Fax: (902) 425-1037

1. Kerogen isolation from oil shales.	2
2. High temperature drilling muds.	2

3. Off shore aggregates and Heavy minerals. 2

Dr. F.A. Jerabek, Associate Professor
Tel: (902) 420-7676 Fax: (902) 425-1027

1. Rock bolt for low seams. 10

2. Sealing of curb ring against the shaft walls. 5, 6

3. Narrow vein mining : conceptual design of new stoping method and mechanization of stoping operations. 5, 7

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Dr. John G. Spray
Associate Professor
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PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Wear and abrasion of excavator bucket teeth under rock quarrying conditions.	5
2. Severe rock alteration during the use of natural diamond and polycrystalline diamond compact drag bits at high speeds.	5

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Elizabeth McDonald
Program Leader
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Fax: (604) 224-0540

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Ergonomic and environmental assessment of open-pit haulage equipment: seating; access; control location and design; visibility; noise and vibration.	1, 5
2. Ergonomic factors related to back injuries at mining operations: questionnaire and interview study.	1
3. Measurement of airborne dust concentrations and particle size fractions using area and personal sampling devices.	1
4. Determination of on-site field gas concentrations using sensitive continuous monitoring techniques.	1
5. Presentation of education workshops on chemical handling, industrial hygiene and toxicology.	1
6. Assistance on selection of respiratory protective devices and the implementation and admistration of a respiratory protection program.	1
7. Identification and size-fraction counting of biological contaminants, such as mould and bacteria, in the workplace atmosphere.	1

8. Identification of unknown gas reaction by-products and process emissions by gas chromatography and mass spectrometry. 1

New Era Engineering Corporation
Northern Mining and Energy Specialists
C.P. 4491
WHITEHORSE, YT
Y1A 2R8

Randy Clarkson
Project Manager,
Tel: (403) 668-3978
Fax: (403) 668-3978

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Gold losses at Klondike placer mines.	2, 3
2. Assessing gold recovery at Yukon placer mines with radiotracers.	2, 3

AISCO Systems Inc.,
P.O. Box 655
BURLINGTON, ON,
L7R 3Y5

T.M. Hopkins
President,
Tel: (416) 335-0002
Fax: (416) 335-9643

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Underground run-of-mine ore conveying system linking four ore passes to the gyratory crusher installation.	5, 8
2. Design and prototype of battery-powered front-end loader (FEL) with hydraulic drive.	5,11

Ed Newmarch, Group Manager - Bulk Material Handling
Tel: (416) 335-0002 Fax: (416) 335-9643

1. Hydraulic breaker boan applications.	5

Dynatec Engineering Ltd.,
2 East Beaver Creek Road
RICHMOND HILL, ON,
L4C 2N3

Fred A. Edwards, P.Eng.,
President
Tel: (416) 886-6950
Fax: (416) 886-8891

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development of rule-based expert system software for use in designing and providing specifications for mine shaft hoisting systems.	5, 9

J.S. Redpath Limited
P.O. Box 810
710 McKeown Avenue
NORTH BAY, ON,
P1B 8K1

J.R. O'Shaughnessey
Vice President and General
Manager
Tel: (705) 474-2461
Fax: (705) 474-1071

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Redpath/Robbins shaft boring machine for boring shafts of 6 m to 7.3 m in diameter.	6, 5
2. Tunnel boring machine for boring tunnels of 2 m to 2.5 m in diameter.	6, 5
3. Winder-tensioner device for installing and tensioning hoist ropes.	5, 9
4. Self-dumping cross-head for shaft sinking.	5
5. Full face sinking of circular concrete shafts.	4, 9
6. Automatic directional drilling using a raisebore machine.	5, 9
7. Blind-hole drilling using a raisebore machine.	5, 6
8. Boxhole drilling using a raisebore machine.	5, 6

Mines Accident Prevention
Association of Ontario (MAPAO),
147 McIntyre Street W.
P.O. Box 1468
NORTH BAY, ON,
P1B 2Y5

W. Coughlan
Executive Director,
Tel: (705) 472-4140
Fax: (705) 472-5800

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Vibration dampening on hand-held pneumatic rock drilling machines.	5
2. Establish a Canadian standard for rockbolts based on ASTM-F432-83	10
3. Fire prevention, detection and suppression guidelines for fuelling and servicing underground mobile equipment.	5

Luc A. Beauchamp Engineer, ground control
Tel: (705) 472-4140

1. Field trials of ground penetrating radar technique for delineating fracture zones and fissures in rock masses.	10
2. Investigating novel techniques for monitoring tension in installed mechanically anchored rockbolts.	10

Mining Industry Research
Organization of Canada (MIROC),
c/o Department of Mining Engineering,
Queen's University
KINGSTON, ON,
K7L 3N6

Dr. P.N. Calder
Research Director MIROC
Tel: (613) 545-6655
Fax: (613) 545-6597

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Quantitative vibration evaluation of rock drill handles	1, 5
2. Spray-on linings for supplementary underground support.	10
3. Evaluation of in-the hole (ITH) dry drilling technology.	5, 7
4. Developing improved footwear for miners.	6

Mining Research Directorate (MRD)
F523, Laurentian University
Ramsey Lake Road
SUDBURY, ON,
P3E 2C6

Charles B. Graham
Managing Director
Tel: (705) 673-6595
Fax: (705) 675-1024

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Stope redevelopment through stabilized fill.	6,10
2. Ground support techniques for moderate rockburst protection.	10
3. Design of support for underground mining excavation in hard rock.	10
4. Canada Rockburst Research Program, Phase II.	10
5. Optimization of small hole drilling and blasting.	10

Strata Engineering Corp.,
170 Donway W.
Suite 410
DON MILLS, ON,
M3C 2G3

Camaran Mirza
Principal,
Tel: (416) 441-2560
Fax: (416) 441-4161

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Recovery of surface crown pillar at Les Mines Selbaie using a controlled caving method.	10,11
2. Numerical modelling of trench material behaviour at Gays River Mine, Nova Scotia.	4,10

Teledyne Canada Mining Products
35 Elgin Street N.
P.O. Box 130
THORNBURY, ON,
N0H 2P0

Dave Pal
President
Tel: (519) 599-2015
Fax: (519) 599-6803

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Teledyne Loadrite; a transducer measures the variances in the hydraulic pressure with a loaded bucket and with an empty bucket, and a computer calculates the weight of the load.	7,11

Vadeko International Inc.
6535 Mill Creek Drive
Unit 62
MISSISSAUGA, ON,
L5N 2M2

Innes Grantmyre
Vice President
Tel: (416) 821-3222
Fax: (416) 821-2232

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Development, construction and testing of prototype accessories for automation of DTH drills.	5,11

Association minière du Québec Inc.
2635, boul. Hochelaga
Suite 942
SAINTE-FOY, PQ,
G1V 4W2

Dr. Claude Drouin
Directeur général
Tel: (418) 657-2016
Fax: (418) 657-2154

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design of crown pillars.	4,10
2. Influence of organisational factors on safety in the work place.	1
3. Rockbolting procedures - ongoing technology transfer in this technical field.	10
4. Research on the exploitation of narrow veined ore bodies.	6, 7
5. Participation with MITEC the research work of the Canadian Centre for Automation and Robotics in Mining (CCARM).	5,11
6. Research on automation of mineral processing with MITEC, CRM, CANMET, Université Laval and many mining companies.	5,11

Dux Machinery Corporation,
615, rue Lavoisier
REPENTIGNY, PQ,
J6A 2E3

Hermann K. Bumueller
Président
Tel: (514) 581-8341
Fax: (514) 581-5138

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Design and development of low profile teledump trucks for use in low headings in underground mines.	5, 8
2. Design and development of Airtrack drill equipped with a high-speed valveless pneumatic rock drill.	5, 7
3. 40 ton dumptruck model DT 40.	4, 7

Machines Roger International Inc.,
C.P. 818,
2200 boulevard Industriel,
VAL D'OR, PQ,
J9P 4P8

Roger Massé
Président
Tel: (819) 825-4657
Fax: (819) 825-0698

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Research, design and development of a horizontal continuous mining machine.	5,11
2. Further research design and development of a continuous mining machine for vertical and steep-angled excavations.	7,11

Lucien Grenier, Vice-président
Tel: (819) 825-4657 Fax: (819) 825-0698

1. Production of model V-30 horizontal continuous mining machine.	5, 7

Noranda Inc.,
Centre de recherche Noranda,
Division de technologie minière,
240, boulevard Hymus
POINTE-CLAIRE, PQ,
H9R 1G5

Jacques H. Nantel
Directeur,
Tel: (514) 630-9300
Fax: (514) 630-9379

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Optimization of underground stope blast design.	4, 7
2. Final stage of the development and testing of an ultra sonic survey probe for determining the contours of inaccessible open stopes or other mine openings.	9,11
3. Development of novel ground monitoring instrumentation : recoverable stressmeter, holographic stressmeter and closure meter.	10,11
4. Development of a rock mechanics ground control field data base for use in mine design and modelling techniques.	10
5. Development of a continuous mining machine for hard rock formations.	5,11
6. Develop numerical modelling for mine design; primarily using Finite Element and Boundary Element techniques.	10,11
7. Ground support optimization using cable support techniques for stabilizing mining excavations. Laboratory work backed by field applications.	4,10
8. Development of commercially viable instrumentation and/or computer systems for full-wave microseismic source location and blast vibration nonitoring.	10,11
9. Remote control and guidance systems that would permit the operation of mining equipment beyond the visual range of the operator.	5,11

10. Automation of bucket loading cycle for LHD equipment.	5,11
11. Development of a portable blasthole survey instrument.	5,11
12. Investigation of the Kaiser Effect for the determination of in situ rock/ground stresses using drill core samples.	10,11
13. Development of a 3-D mine modelling program.	10,11
14. Development of automatic guidance systems for LHD equipment and off-highway trucks.	5,11
15. Installation and centralized monitoring of microseismic systems installed at operating mines in Central and Eastern Canada.	10,11
16. Transfer of the geomechanical stope design (dimensioning) technologies between the research centre and the field operation.	10,11
17. Development of the use of computer vision technology to operate rock breakers, eg. at an underground grizzly.	5,11
18. Development of a portable OTDR convergence meter for use in mine development operations.	4,11
19. Electronic delineation of geological features.	10
20. Mine ventilation automation.	9
21. Mine mobile equipment improvement.	5
22. Secondary ore dust explosions: Blast gas evaluation.	7
23. Fire detection system for underground mines.	9
24. CO_2 mine ventilation control strategy.	9
25. New backfill technology.	10
26. Rock mass classification research.	7
27. Detection of radio frequency emissions during rock fragmentation.	7,11

28. Rock fragmentation using electricity. 11

Gilbert Sauriol, Scientifique senior
Tel: (514) 630-9300

1. To develop and test a mine-wide monitoring system. 4,11
2. To investigate the benefits of force feedback to remote control operation. 4,11
3. To investigate the use of electro-magnetic waves to locate drill holes. 4,11
4. To design and test an underground radio warning system. 4,11

D.L. Sprott, Mining Engineer
Tel: (514) 630-9348

1. Development of controlled blasting. 4, 7
2. Development of a blasthole deviation monitor. 4, 5
3. Development of a blast monitoring system. 4, 5

British Columbia Ministry of
Energy, Mines & Petroleum Resources
Room 105 - 525 Superior Street
VICTORIA, BC
V8V 1X4

T.G. Carter,
Head, Mechanical Eng./Material Handling
Tel: (604) 356-2197
Fax: (604) 356-5985

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Causes and alleviation of coal dust problems associated with coal transportation in low climatic temperatures.	1, 8
2. Vehicle restraint systems and large off-highway haul truck dumping procedures.	5, 8
3. Update and expansion of a database containing information pertaining to design data and brake testing of large off-highway haul trucks qualified for use at mines in BC.	5, 8
4. Remote control of vehicles.	5, 8
5. Effectiveness of runaway lanes and impact barriers in arresting vehicles travelling downgrade.	8
6. Automatic regeneration of ceramic filters used for the removal of particulate emissions in underground environments.	5, 8
7. On-board systems monitoring using data communication links for heavy-duty vehicle applications.	5, 8

R.F. King, Electrical Inspector of Mines
Tel: (604) 356-2197

1. Underground and surface blasting operations during lightning storms - an evaluation of the hazard.	5

2. Grounding underground electrical systems. 5

3. Safe grounding of portable electrical substations. 5, 1

Alberta Office of Coal
Research & Technology
3rd Floor, Blue Cross Place,
10009 - 108 Street,
EDMONTON, AB,
T5J 3C5

J.K. Kleta
Chairman
Tel: (403) 427-8042
Fax: (403) 422-0975

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Downhole geophysics.	3,10
2. Surface geophysical techniques for foothills and mountain coalfield exploration.	3,10
3. Thick seam extraction and continuous haulage mining demonstration.	4,10
4. Tailings reclamation.	8, 3
5. On-line coal analyzers.	5,11
6. Regional (1:50,000) coal mapping program.	3
7. Geological maps and cross-sections, scale 1:50,000, of the Coalspur Coalfield.	3
8. Regional coal quality assessment of Lower Horseshoe Canyon Formation coals in the Plains region of Alberta.	3
9. Coal database.	11, 3
10. Coal Geoscience Information System.	11, 3

CANMET, Coal Research Laboratories,
Surface Mining Laboratory,
P.O. Bag 1280
DEVON, AB,
T0C 1E0

D. Bruce Stewart
Manager, Mining Research
Tel: (403) 987-8238
Fax: (403) 787-3430

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Operations research for surface coal and oil sands mines, such as: time studies, computer simulation, equipment performance and computerized control technology.	3, 4
2. Equipment selection and new technologies for surface coal and oil sands mining; (blast-casting, in-pit crushing/conveying, continuous mining equipment etc.).	4, 5
3. Geotechnical engineering for surface coal and oil sands mines (pit walls, dumps, tailings dams etc.).	3,10
4. In situ oil sands recovery, including underground access technology.	4,12

Manitoba Department of Energy and Mines
Mines Branch
555-330 Graham Avenue
WINNIPEG, MB,
R3C 4E3

A. Ball
Project Coordinator
Tel: (204) 945-6517
Fax: (204) 945-0586

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Overburden stabilization.	3
2. Secondary recovery of base metals by in situ bacterial leaching.	12
3. Evaluation of non-destructive testing (NDT) of hoisting ropes.	1, 5
4. Development of a long-life pneumatic tire for underground use,	7, 5

Saskatchewan Research Council
15 Innovation Blvd.,
SASKATOON, SK
S7N 2X8

Mike Sulatisky
Manager, Engineering
Services Program,
Tel: (306) 933-5468
Fax: (306) 933-5493

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Joseph T. Jones Tel: (306) 933-5874 Fax: (306) 933-7446	
1. Design, development and manufacture of customised rock mechanics instrumentation for use in potash mines.	10, 5
2. Large sample triaxial creep testing facility.	10
Randy G. Gillies, Manager, Pipeline Technology Tel: (306) 933-5473 Fax: (306) 933-5493	
1. Slurry Pipeline Test Facility.	2, 9
Bryan T. Schreiner, Manager, Minerals/Ground water Tel: (306) 933-5495	
1. Exploration technology such as mineralogy, geology, geochemistry, X-ray diffraction and other related subjects.	2, 3
2. Study of permeability of glacial tills and related ground water flow characteristics.	3
3. Environmental and ground water characteristics associated with potash mining operations.	3, 9
4. Study of mine decommissioning options in respect to environmental matters.	1, 3
5. Mineral processing facilities and services.	2, 12

Atomic Energy Control Board,
Health & Environmental Effects Section,
Research & Radiation Protection Branch,
Martel Building,
270 Albert Street,
OTTAWA, ON,
K1P 5S9

Dr. Harold Stocker
Chief, Health & Environment
Tel: (613) 995-2866
Fax: (613) 995-5086

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Scientific Authority for projects being undertaken by the Research and Radiation Protection Branch of AECB that are not listed hereunder.	1

Dr. P.J. Duport, Scientific Adviser
Tel: (613) 995-2896

1. Tracer gas method for assessing ventilation efficiency. (4.113.1)	9
2. Assessment of errors on airflow measuring instruments. (3.124.1)	1, 9
3. Electrical charge of radioactive aerosols in uranium Mines. (4.112.1)	1
4. Study of the health effects of inhaled uranium ore dust. (4.101.1)	1, 9
5. Evaluation of long lived dust exposures from silica samples. (4.117.1)	1, 9
6. Temporal variation of airborne radioactivity in mines. (4.129.1)	1, 9
7. Epidemiology of lung cancer mortality in Canadian mining communities. (7.093.1)	1

Dr. J.L. Wallach, Scientific Adviser
Tel: (613) 995-2509 Fax: (613) 943-1292

1. Decommissioning open pit mines. (5.129.1) 1
2. Link between ore bodies and blosphere concentrations of metals. (5.140.1) 1
3. Review of groundwater dating and its relation to high level waste disposal. (5.141.1) 1

Dr. M. Rao Avadhanula, Scientific adviser
Tel: (613) 995-2618

1. Radionuclide concentration in fish: Phase I-screening Program. 1, 3
2. Frost evolution in tailings. (5.135.1) 1, 3
3. Hydrology of Quirke and Panel tailings basins. (5.136.1) 1
4. Feasibility of monitoring tailings sites using remote sensing. (5.142.1) 1, 3

V. Elaguppillai, Scientific Advisor
Tel: (613) 995-3041

1. Ontario Miners Mortality Study - Phase III. (4.106.3) 1, 9
2. Evaluation of exposure records of Eldorado uranium miners. (4.118.1) 1, 9
3. Mortality analysis of Beaveridge uranium miners from 1981-1987. (4.118.2) 1
4. Evaluation of radon daughter exposures of Port Radium miners. (4.130.1) 1

5. Mortality analysis of the fluorspar miners from 1985-1988. (7.142.1) 1

6. Ontario miners mortality study - annual update. 1

K.P. Ho, Scientific Advisor
Tel: (613) 995-2866 Fax: (613) 995-5086

1. Physical characteristics and solubility of long-lived airborne particulates in uranium producing and manufacturing facilities. (4.103.2) 1, 9

2. Intercomparison of aerosol sampling instruments. (4.108.1) 1, 9

Eric Rabin, Scientific Advisor
Tel: (613) 995-2866 Fax: (613) 995-5086

1. Evaluation of mine ventilation monitoring devices. (4.119.1) 1, 9

CANMET, Mining Research Laboratories,
Energy, Mines and Resources,
555 Booth Street
OTTAWA, ON
K1A 0G1

Dr. J. Udd
Director, MRL
Tel: (613) 996-8603
Fax: (613) 995-3456

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
CANMET, IN-HOUSE RESEARCH	
Elliot Lake Laboratory	
1. Rockburst Research Program (second 5 yr phase) Canada, Ontario and the Canadian mining industry: Investigating stability and rockburst activity in mines.	4,10
2. Identification of major sources of radiation and the factors affecting the release of radiation in mines; study by tracer gas and radiation	1, 9
3. Evaluation of pillar stability on a local and regional scale in Canadian hardrock mines and determination of pre-mining stresses in rockburst-prone mines.	1,10
4. Develop new seismic equipment and monitoring techniques for studying rockbursts in hardrock mines and to carry out seismic studies.	10,11
5. Development and operation of air analysis facility using tracer gas techniques for evaluation of mine ventilation circuits.	1, 9
6. Optimization of mine ventilation circuits. Development of air management (direct flow and recirculation) and pollution and energy control capabilities.	1, 9
7. Operation of state-of-the-art dust tunnel facility for calibration of respirable dust measuring and sampling instruments on cost recovery service basis.	1, 9

8. Establishment of X-ray diffraction analysis facility for evaluation of airborne silica dusts in mine airways. 1, 9

9. Development of monitoring system for respirable dust and particulates emanating from diesel emissions in mine airways and ventilation circuits. 1, 9

10. Assessment of airflow measuring devices and instruments used for the detection of radiation in underground mine airways. 1, 9

11. Establish and operate the National Radon and Thoron Test Facility (NRTTF) for calibrating and testing radiation measuring equipment. 1, 9

12. Conduct radon and radon daughter surveys in mines to evaluate radiation levels in working places. 1, 9

13. Study of the migration patterns of metals and radionuclides associated with uranium mine tailings. 1, 9

14. Development and evaluation of instruments for the rapid determination of radon and thoron daughters in mine environments. 1, 9

15. Study of wet barriers on/in pyritic uranium tailings to develop procedures to control acid generation. 1, 9

16. Evaluation of mine ventilation instruments and devices, other than radiation. 1, 9

17. Correlation of Long Lived Radio Active dust and Silica. Operation of LLRD facility on cost recovery service basis. 1, 9

18. Developing engineered cover for reactive acid tailings. 1, 9

Sudbury Laboratory

1. Review of laboratory and in situ testing methods for establishing the physical and engineering properties of mine backfill materials. 3,10

2. Determination of alternative backfill materials for Ontario mines (Ontario MDA). 3,10

3. Backfill testing services, on a cost recovery basis. 3,10

Canadian Mining Technology Laboratory

1. Carry out analytical numerical modelling studies as part of applied ground control investigations - Numerical Modelling Group. 10,11

2. Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high-level radioactive waste containment. 3

3. Develop new ore reserve evaluation methodologies. 3

4. Research to increase potash recoveries in Canadian mines. 4,10

5. Maintaining a database of information on current and developing mining technology. (Mining Technology Index) 1, 9

6. Developing a handbook for the safe and economic design of surface crown pillars. 4,10

7. Establish the strength, deformational characteristics and other physical properties of rock types encountered in rock mechanics research investigations. 10

8. Evaluation of rock mass stability for surface crown pillars. 10

9. Develop new rock mechanics tests and test procedures, and provide rock testing services on cost recovery basis. 3,10

10. Establish data bank on peak and residual rock strengths and other physical properties for rocks commonly encountered in Canadian mining operations. 3,10

11. Development of a reliable high resolution radial monitoring device for recording changes in borehole diameter due to stress caused by mining operations.	3, 5
12. Calculation of ore reserves for mineral deposits other than uranium.	2, 3
13. Study of heat control in underground hardrock mines, especially control of heat flow in cold environment mines located in permafrost regions.	3,10
14. Materials handling and operations research regarding the development and implementation of truck dispatching systems.	1, 8
15. Ore grade control and blending requirements in mining operations.	3, 8
16. Study of rock fragmentation as a result of using explosives for rock breakage.	7
17. Study of rock breakage by mechanical excavation and cutting techniques in hardrock conditions.	5, 7
18. Study of small mine operating costs and development of suitable software to estimate operating costs.	2,11
19. Development of borehole instrumentation to monitor ground stress conditions. Undertake related surveys etc. on a cost recovery basis.	5,10
20. Development of a software package to accommodate conceptual and operating mine design functions.	2,11

Canadian Explosives Atmospheres Laboratory (CEAL)

1. Certification of explosion-proof equipment, fire-resistant materials hydraulic fluids, and gas detection instruments. Technical information and certification service, on cost recovery basis.	1
2. Transfer and privatization of diesel emissions control technology	1, 5

3. Monitoring the continuing compliance of apparatus and materials certified by EMR, and maintain a certification history of EMR certified products. 1

4. Participation in the development of standards related to the certification of apparatus and materials for use in gassy mines. 1, 5

5. Investigation and study of sulphide ore dust explosions. 1, 8

6. Control of coal and other dust explosions. 1, 8

7. Development of laboratory facilities for studying dust and gas explosions. 1

8. Research and development of alternate ceramic filter materials suitable for diesel emission control units. 1, 5

9. Development of a facility to study automated data collection and vehicule cycle simulation for diesel engines. 1

10. Study of automated control of ventilation systems in Ontario mines. 9

11. Underground field studies to assess air quality in Canadian mines; associated with the AQI studies. 1, 9

12. Evaluation and refinement of NDT equipment used for testing mine-shaft wire ropes. 5

Canadian Explosives Research Laboratory (CERL)

1. Certification of explosive materials and devices. 1

2. Enhance explosives certification capabilities and develop new certification standards and procedures. 1

3. Provision of consultation services regarding explosive substances, materials and devices. 1

4. Explosives, propellants and pyrotechnics research; specifically, thermal properties and numerical modelling technology. 1

CANMET, CONTRACT RESEARCH

1. Seismic characterization of discontinuities and anomalous rock faults in surface crown pillars using alteration and velocity imaging [9-9153] (Queen's University). 10, 3

2. Recovery of surface crown pillars overlain by 40 m of overburden at Les Mines Selbaie using a controlled caving method of mining. [7-9195] 3,10

3. Study and evaluation of sulphide dust SO_2 monitoring systems [8-9227] (Noranda Research). 1, 9

4. Study the effect of scale on dust explosions [8-9070] (AECL Whiteshell Laboratory). 1

5. Study of methane/coal dust explosions [9-9200] (Technical University of NS). 1

6. Study and assessment of equipment and apparatus for the non-destructive testing of wire ropes, particularly mine hoist ropes [9-9188] (Wire Rope Industries Ltd.) 9, 5

7. Study and evaluation of chemical grouting techniques in underground mines [9-9121] (Domtar, Gypsum Division). 5,10

8. Study of mining methods relative to Canadian and non-canadian mines exploiting narrow-veined ore bodies. (Consortia) 2, 4

9. Design, construction and testing of a retrofit package for a commercial raise borer for blind drilling operations in hard rock mines (IRAP Project). 5

10. Development of a low-cost conveyor system with special attention to environmental problems of dust omission. (IRAP Project) 1, 5

11. Development of a 3-D mine planning and design software package for operating mines [8-9163] (Lynx Geosystems Inc.). 4,11

12. Identification of needs and required trends in mining equipment design from point of view of Canadian mine operations [9-9133] (Custom Industrial Automation). 5

13. Development of a compact underground boring machine (CUB) for use in hard rock conditions. (IRAP Project) 5

14. Field evaluation of the effectiveness of engineered soil covers for reactive tailings [0-9061]. (Noranda Research) 3

15. Engineering design of blindhole boring equipment for development work in hardrock mines [9-9244]. (J.S. Redpath) 5

16. Development of artificial sill pillar design [9-9232]. (Echo Bay Mines) 4,10

17. Slope deformation mechanism at Cassiar Mine [9-9227]. (Cassiar Mine) 3,10

18. Stability of the overburden hanging wall, Gays River Mine, Nova Scotia, (Phase II) [9-9194] (Westminster Can Ltd. - Seabright Operation). 4,10

19. Effect of wet salt backfill on yield pillar strength and deformation [9-9192] (IMC - Corp.) 4,10

20. Production blast optimization study at Highland Valley Copper Mine. [9-9162] (Golden Assoc.) 7

21. Report on the development of blasting research. [9-9160] (HBM&S-Man) 7

22. Development of ground stability guidelines for cut-and-fill mining of wide ore bodies. [9-9145] (Placer Dome Inc. - Detour Lake) 10

23. Characterization and yard control of conveyor-generated coal dust. [9-9142] (Univ. of Westen Ontario) 1

24. Development of an interactive post-processor for the BEAP software system. [9-9137] (Cube Systems Consulting) 10, 11

25. Expert systems module development for cut-and-fill mining. [9-9134] (Falconbridge) 10, 11

26. In situ properties of backfill alternatives in Ontario mines (COMDA) [6-9011] (Falconbridge) 4, 10

27. Simulation of bulk mining at depth with backfill in Ontario mines. [6-9033] (Inco Ltd.) 4, 10

FEDERAL PROVINCIAL MINERAL DEVELOPMENT AGREEMENTS

Mineral Development Agreements (MDA's) stimulate the development of mineral resources in the provinces participating in these jointly funded EMR - Provincial programs.

The CANMET Mining Research Laboratories (MRL) Division is involved in MDA's and other similar programs, such as the Northern Territories Assistance Program (NTAP), and the Atlantic Canada Opportunities Agency (ACOA).

At present, MRL is involved with six MDA type programs.

The projects initiated under these agreements, in accordance with specific objectives stipulated in the technical programs, are jointly funded by the federal and provincial governments and industry, under different scenarios that depend on the risks involved and the nature of the work being undertaken.

CANMET is responsible for delivery of the research and technology component portions of the initiatives, which are designed to promote the mineral economies of the provinces. Special emphasis is being placed on research geared to provide improvements in environmental protection; to increase industrial competitiveness; and better miner health and safety.

Between 1984 and 1989, four provinces: Ontario, New Brunswick, Manitoba and Saskatchewan, signed agreements with mining related technical program components. In 1989, Québec initiated a technical program valued at $2M, and the Northwest Territories began funding research and development projects in mining technology under NTAP.

With the exception of the Ontario and Québec MDAs, which terminate on March 31, 1991, the other MDA projects were concluded in 1990.

Negotiations are presently on-going with several provinces for renewal or establishment of MDA's. Two MDA's were renewed for another five years with Newfoundland and New Brunswick, while the Nova Scotia Agreement was renewed for an additional two years.

At the time of going to print MRL was involved in the following MDA funded projects:

Newfoundland

1. Blast modelling software.

Nova Scotia

1. Control of groundwater hazards.
2. Generic TDR monitoring of shallow underground openings.
3. Open pit wall stability.
4. Ore blending studies - open pit mining.
5. Extraction methods at rock salt mine.
6. Empirical design of crown pillars. (multi-veined deposits)

New Brunswick

1. Monitoring $C0_2$ in mine ventilation systems.
2. Ground control monitoring surveys in potash and salt mines.
3. Evaluation of improved NDT for mine wire ropes.
4. Reducing sulphide ore dust explosions.

Quebec

1. Mining techniques for small veined ore bodies.
2. Technical and economic feasibility of mine backfill.
3. Expert systems for use with and maintenance of hoisting systems in mines.
4. Measurement and analysis of vibration associated with jacklegs used in underground mines.
5. Development of automated readout meter for ore grade control in gold mines.

Ontario

1. 3-D numerical modelling for bulk mining operations.
2. Backfill alternatives for Ontario mines.
3. Use of cemented fills for controlling violent failures in pillars.

Manitoba

1. Optimization of blast design for blasthole mining operations.
2. Development of guidelines for blasthole mining operations.
3. Development of geomechanical data base for ground control in deep mines.
4. Ground stability evaluation of en-echelon ore bodies.

Northwest Territories

1. Post pillar recovery strategies at Nanisivik mine.
2. Blast design at Lupin mine.
3. Heat flow model calibration at Polaris Mine.

CANMET, Mineral Science Laboratories
Concrete Technology Section
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Dr. D.E. Douglas
Tel: (613) 992-6455
Fax: (613) 992-9389

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Joint research project with Falconbridge Mines Ltd dealing with the utilization of Kidd Creek granulated copper slag in consolidated rock fill.	10

Ontario Ministry of Labour,
Mining Health and Safety Branch,
OH&S Division,
260 Cedar Street,
SUDBURY, ON,
P3B 3X2

Doug Ames
Chief Engineer - Technical,
Tel: (705) 675-4468
Fax: (705) 673-1720

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Joint CANMET/Ontario MOL/Industry rockburst research program.	10
2. Wire rope and hoisting technology. CANMET/Ontario MOL/USBM joint project.	5, 9
3. Diesel emissions in underground U.S. mines. Ontario MOL/USBM joint project.	5, 1
4. Evaluation of a non-destructive testing device for mine shaft wire ropes. CANMET/Ontario MOL/USBM joint project.	9
5. Evaluation of underground lighting.	4

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Chef du service,
Tel: (418) 643-4540
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PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Computerization of mine operations; application and adaption of CAO/CAD modelling software.	10,11
2. Manual of technology applicable to mining machines.	5, 9
3. Research to develop an expert system in ground support.	11
4. Portfolio of underground mining methods and operations.	2, 6
5. Techniques for predicting acid mine drainage problems.	3
6. Prevention and elemination of acid mine drainage problems.	3
7. Commissioning systems for the treatment of natural acid mine drainage water.	3
8. Update information on tunnelling and continuous mining machines.	5
9. Compile and edit a manual on the critera, parameters and techniques for the planning design and of open pit mines.	4
10. Establishing a centre for mine ventilation calculations and simulation to service Québec mines.	4, 9
11. Escalate the development of expert systems in various fields of application related to the mining industry.	11
12. Development and dissemination of techniques for measurement in situ rock property parameters.	10

13. Upgrading the Rock Mechanics Laboratory at CRM. 10

14. Studying methods for establishing the dimensions of u/g openings. 4,10

15. Methods for monitoring and sounding ground/rock cautions. 10

16. Improvement of the controls for rock breaking with explosives. 7

17. Developing reliable consistent monitoring techniques for acid mine drainage. 3

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Cape Breton Coal,
Research Laboratory
210 George Street
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Dr. Dave Forrester
Groupe Leader
Tel: (902) 564-7670
Fax: (902) 539-8300

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Methane content of coal.	4, 9
2. Airborne dust control in mines.	4, 9
3. Ventilation performance and control in underground mines by the use of tracer gas techniques.	4, 9
4. Evaluation of packing systems and materials.	10
5. Rockbolting systems for mine support.	10
6. Evaluation of shearer extraction drum performance.	5, 11
7. Determination of in situ stress fields.	10
8. Methane release patterns of coal seams.	4, 9
9. Determinations of specific energies for the cutting of coals.	5, 7
10. Determination of methane content of sandstones.	4, 9
11. Determinations of effect of multi-seam workings interactions.	10
12. Subsidence prediction: Effects on/to the surface.	3, 10

Cape Breton Development Corp.
P.O. Box 2500
SYDNEY, NS
B1P 6K9

Bruce Clyburn
Manager, Process Control & Technology
Tel: (902) 564-3889
Fax: (902) 564-2589

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Bore hole logging (geophysical) for coal mines.	5,11
2. Long term disposal of fine coal tailings.	4,12
3. Integration of mine and production planning.	7, 8
4. Mild gasification of Nova Scotia coals.	11,12
5. Reinterpretation of Point Aconi offshore seismic program.	2,11
6. Utilization of mine methane	2,11
7. Coal gasification test.	11, 6
8. Activated carbon study.	9,12
9. Optimization of metallurgical coal production.	2,12
10. Interaction and subsidence of ZW Phalen-Lingan.	10
11. Monitoring anhydrite packing.	4,10
12. Intersection instrumentation for support performance.	4,10
13. Rock bolting demonstration project.	7,10
14. Water pressure flows on shearers.	4, 7
15. Monitoring loader gate for potential reuse.	10, 5

16. Line addition to reduce acid leachate in high sulfur. 2, 8

17. Measure the effect of thermal drying on methane desorption. 7, 8

18. Sulfur capture in fluidized bed. 2, 11

New Brunswick Occupational Health
and Safety Commission
P.O. Box 6000
500 Beaverbrook Court
FREDERICTON, NB,
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R. Blanchard, P.Eng.,
Director Inspection Services,
Tel: (506) 453-2467
Fax: (506) 453-7982

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
1. Evaluation of non-destructive hoist rope testing equipment.	5, 9
2. Collaboration RCD/Soot sampling and descrimination program for dieselized.	5

Research & Productivity Council (RPC)
P.O. Box 6000
FREDERICTON, NB
E3B 6C2

D. Abbot
Manager, R&D,
Tel: (506) 452-8994
Fax: (506) 452-1395

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE
Dr. J.C. Thornley, Senior Metallurgist Tel: (506) 452-8994 Fax: (506) 452-1395	
1. Examination of wire ropes to determine failure mechanisms.	5
2. Testing of rock bolts.	5
3. General mine equipment failure analysis.	5
4. Rotating machinery (fans, shafts, gears etc) failure analysis and weld repair.	5
Lee Danisch, Head, Electronics Division, Tel: (506) 452-8997 Fax: (506) 452-8997	
1. Electrokinetic dewatering of coal slurries.	2,12
2. Stress alarm system for mining equipment.	5,11
3. Maximization of dragline operations by developing expert systems to monitor operating parameters.	5, 11
Cosmos Voutsinos, Head, Engineering Services Tel: (506) 452-8994 Fax: (506) 452-1395	
1. Design and manufacture (turn key) an industrial robot.	5,11

SECTION 2

Projects Listed by Categories

MINE INDEX CATEGORIES

1. ADMINISTRATION : Mine Administration includes manpower training and development, health and safety of employees, management organization, voice communication, data communication, remote monitoring and labour relations.

2. FEASIBILITY : Mine Feasibility includes economic studies, mine evaluations, cost estimations and other projects undertaken to determine the potential success of major capital expenditures to develop a new mine, rehabilitate an old mine or expand an existing mine for increased production or better productivities.

3. SURFACE TECHNOLOGY : Surface Technology includes prospection, exploration, sampling, modelling, geostatistics, hydrology and geotechnology. It will also include projects dealing with environmental subjects, waste management, dewatering and other site work such as roads, bridges, dams and runways.

4. DESIGN : Mine Design includes selecting stope and pillar patterns and mining methods for new mines or for existing operations that are to be modernized or expanded. The category also includes planning, scheduling and grade control.

5. EQUIPMENT : Equipment includes equipment design, selection and maintenance as well as installed and consumable supplies.

6. DEVELOPMENT : Development includes methods of advancing mine and stope access headings leading to the fragmentation and removal of the muck to the haulage system.

7. PRODUCTION : Stoping includes operational topics such as fragmentation, blast pattern design, drilling methods, explosives and all other matters connected to preparing a block of ore, either a stope or a pillar, for drilling and blasting and removal of the fragments to the haulage system.

8. MATERIALS HANDLING : Materials Handling includes the movement of fragmented material, from stope or development heading, via loading/transportation systems, grizzlies, rock-breakers, ore passes, crushers, surge and storage bins and loading pockets to surface.

9. SERVICES : Mine Services include ventilation, surveying, compressed air, dewatering systems, air heating, hoisting plant (hoist, headframe, shaft conveyances and all shaft installations) and electrical supply, control and distribution.

10. GROUND CONTROL : Ground Control includes rock mechanic studies, ground support mechanisms and ground support preparation, placement and installation.

11. HIGH TECH : High Tech includes computers, robotics, water jets or other new and innovative systems.

12. PROCESSING : Processing includes general milling operations, mill recoveries, concentrate grades, reagent consumption, etc., as well as in-situ and heap leaching operations on surface or underground, and recovering economic values from tailings and waste dumps.

1. ADMINISTRATION

	PROJECT TITLE / TITRE DU PROJET	PAGE
1.	Measurement of airborne dust concentrations and particle size fractions using area and personal sampling devices.	99
2.	Determination of on-site field gas concentrations using sensitive continuous monitoring techniques.	99
3.	Presentation of education workshops on chemical handling, industrial hygiene and toxicology.	99
4.	Assistance on selection of respiratory protective devices and the implementation and admistration of a respiratory protection program.	99
5.	Identification and size-fraction counting of biological contaminants, such as mould and bacteria, in the workplace atmosphere.	99
6.	Identification of unknown gas reaction by-products and process emissions by gas chromatography and mass spectrometry.	100
7.	Ergonomic and environmental assessment of open-pit haulage equipment: seating; access; control location and design; visibility; noise and vibration.	99
8.	Ergonomic factors related to back injuries at mining operations: questionnaire and interview study.	99
9.	Examination of sulphide dust explosions in Canadian mines.	62
10.	Development of PNET program for project scheduling.	62
11.	Evaluation of ceramic exhaust filters on load-haul-dump (LHD) equipment.	14
12.	Development of mine-wide computerized database system.	6

PROJECT TITLE / TITRE DU PROJET	PAGE
13. Evaluation of non-destructive testing (NDT) of hoisting ropes.	121
14. Managing for Consistency training courses, as part of a continuous management improvement strategy.	59
15. Implementation of quality management in mining applications.	59
16. Firm level productivity Measurement for the Ontario metal mining Industry.	78
17. A model to predict toxic fumes from explosives and dilution ventilation.	77
18. Computerization of ventilation surveys.	37
19. Identification of major sources of radiation and the factors affecting the release of radiation in mines; study by tracer gas and radiation	126
20. Evaluation of pillar stability on a local and regional scale in Canadian hardrock mines and determination of pre-mining stresses in rockburst-prone mines.	126
21. Development and operation of air analysis facility using tracer gas techniques for evaluation of mine ventilation circuits.	126
22. Optimization of mine ventilation circuits. Development of air management (direct flow and recirculation) and pollution and energy control capabilities.	126
23. Operation of state-of-the-art dust tunnel facility for calibration of respirable dust measuring and sampling instruments on cost recovery service basis.	126
24. Establishment of X-ray diffraction analysis facility for evaluation of airborne silica dusts in mine airways.	127

	PROJECT TITLE / TITRE DU PROJET	PAGE
25.	Development of monitoring system for respirable dust and particulates emanating from diesel emissions in mine airways and ventilation circuits.	127
26.	Assessment of airflow measuring devices and instruments used for the detection of radiation in underground mine airways.	127
27.	Establish and operate the National Radon and Thoron Test Facility (NRTTF) for calibrating and testing radiation measuring equipment.	127
28.	Conduct radon and radon daughter surveys in mines to evaluate radiation levels in working places.	127
29.	Study of the migration patterns of metals and radionuclides associated with uranium mine tailings.	127
30.	Development and evaluation of instruments for the rapid determination of radon and thoron daughters in mine environments.	127
31.	Study of wet barriers on/in pyritic uranium tailings to develop procedures to control acid generation.	127
32.	Evaluation of mine ventilation instruments and devices, other than radiation.	127
33.	Correlation of Long Lived Radio Active dust and Silica. Operation of LLRD facility on cost recovery service basis.	127
34.	Developing engineered cover for reactive acid tailings.	127
35.	Maintaining a database of information on current and developing mining technology. (Mining Technology Index)	128
36.	Materials handling and operations research regarding the development and implementation of truck dispatching systems.	129

	PROJECT TITLE / TITRE DU PROJET	PAGE
37.	Certification of explosion-proof equipment, fire-resistant materials hydraulic fluids, and gas detection instruments. Technical information and certification service, on cost recovery basis.	129
38.	Transfer and privatization of diesel emissions control technology.	129
39.	Monitoring the continuing compliance of apparatus and materials certified by EMR, and maintain a certification history of EMR certified products.	130
40.	Participation in the development of standards related to the certification of apparatus and materials for use in gassy mines.	130
41.	Investigation and study of sulphide ore dust explosions.	130
42.	Control of coal and other dust explosions.	130
43.	Development of laboratory facilities for studying dust and gas explosions.	130
44.	Research and development of alternate ceramic filter materials suitable for diesel emission control units.	130
45.	Development of a facility to study automated data collection and vehicule cycle simulation for diesel engines.	130
46.	Underground field studies to assess air quality in Canadian mines; associated with the AQI studies.	130
47.	Certification of explosive materials and devices.	130
48.	Enhance explosives certification capabilities and develop new certification standards and procedures.	130
49.	Provision of consultation services regarding explosive substances, materials and devices.	130

	PROJECT TITLE / TITRE DU PROJET	PAGE
50.	Explosives, propellants and pyrotechnics research; specifically, thermal properties and numerical modelling technology.	130
51.	Study and evaluation of sulphide dust SO_2 monitoring systems [8-9227] (Noranda Research).	131
52.	Study the effect of scale on dust explosions [8-9070] (AECL Whiteshell Laboratory).	131
53.	Study of methane/coal dust explosions [9-9200] (Technical University of NS).	131
54.	Development of a low-cost conveyor system with special attention to environmental problems of dust omission. (IRAP Project)	131
55.	Characterization and yard control of conveyor-generated coal dust. [9-9142] (Univ. of Westen Ontario)	132
56.	Improvement of underground radio communications.	27
57.	Quantitative vibration evaluation of rock drill handles	106
58.	Mine radio system - leaky feeder technology.	39
59.	Diesel emissions in underground U.S. mines. Ontario MOL/USBM joint project.	138
60.	Modelling (simulation) of the productivity of single mining machines, man-machine synergism and machine systems.	86
61.	Remote surveillance of mine plant entrances.	46
62.	Study for computerized inventory control.	47
63.	Development of alternative grading categories for chrysotile asbestos.	47

PROJECT TITLE / TITRE DU PROJET	PAGE
64. Communication systems for underground workers.	57
65. Influence of organisational factors on safety in the work place.	111
66. Environmental impact on mining in Canada.	67
67. Surface photo-lineament studies as an aid to identifying sub-surface geology.	20
68. Study of mine decommissioning options in respect to environmental matters.	122
69. Install and commission u/g radio communications system	42
70. Study of sulphide dust explosions in Canadian mines - a fine particle approach.	69
71. Work related health and safety studies.	53
72. Computerization of bonus pay schemes, phase II.	55
73. Implementation of mine-wide underground radio communication system.	38
74. Mining environment database in the subject areas of abandoned mines and land reclamation.	71
75. The lifetimes and pathways of the PAHs and mutagens in dieselized underground mines. (Dr. D. Hallman, assoc. researcher)	72
76. Determination of the nitro PAHs and mutagens generated by the catalytic converters used on underground diesel equipment.	72
77. Causes and alleviation of coal dust problems associated with coal transportation in low climatic temperatures.	117

	PROJECT TITLE / TITRE DU PROJET	PAGE
78.	Safe grounding of portable electrical substations.	118
79.	Research on causes, effects and prevention of sulphide dust explosions.	35
80.	Development of engineering controls for environmental noise attenuation and personal hearing protection. (Lester Kneen, Chief surveyor).	35
81.	Development of computer programs to monitor exposure of workers to various specified environmental toxic pollutants. (L. Gotz Environmental Engineer)	35
82.	Scientific Authority for projects being undertaken by the Research and Radiation Protection Branch of AECB that are not listed hereunder.	123
83.	Assessment of errors on airflow measuring instruments. (3.124.1)	123
84.	Electrical charge of radioactive aerosols in uranium Mines. (4.112.1)	123
85.	Study of the health effects of inhaled uranium ore dust. (4.101.1)	123
86.	Evaluation of long lived dust exposures from silica samples. (4.117.1)	123
87.	Temporal variation of airborne radioactivity in mines. (4.129.1)	123
88.	Epidemiology of lung cancer mortality in Canadian mining communities. (7.093.1)	123
89.	Decommissioning open pit mines. (5.129.1)	124
90.	Link between ore bodies and biosphere concentrations of metals. (5.140.1)	124
91.	Review of groundwater dating and its relation to high level waste disposal. (5.141.1)	124

	PROJECT TITLE / TITRE DU PROJET	PAGE
92.	Radionuclide concentration in fish: Phase I-screening Program.	124
93.	Frost evolution in tailings. (5.135.1)	124
94.	Hydrology of quirke and panel tailings basins. (5.136.1)	124
95.	Feasibility of monitoring tailings sites using remote sensing. (5.142.1)	124
96.	Ontario Miners Mortality Study - Phase III. (4.106.3)	124
97.	Evaluation of exposure records of Eldorado uranium miners. (4.118.1)	124
98.	Mortality analysis of Beaveridge uranium miners from 1981-1987. (4.118.2)	124
99.	Evaluation of radon daughter exposures of Port Radium miners. (4.130.1)	124
100.	Mortality analysis of fluorspar miners from 1985-1988. (7.142.1)	125
101.	Ontario miners mortality study - annual update.	125
102.	Physical characteristics and solubility of long-lived airborne particulates in uranium producing and manufacturing facilities. (4.103.2)	125
103.	Intercomparison of aerosol sampling instruments. (4.108.1)	125
104.	Evaluation of mine ventilation monitoring devices. (4.119.1)	125
105.	Design of a control system to accommodate flexible costs and permit steady operational progress.	44

2. FEASIBILITY

PROJECT TITLE / TITRE DU PROJET	PAGE
1. Computer program for estimating capital and operating costs, and update of CIM special volume.	62
2. A microcomputer - based approach to geostatistical ore reserve estimation.	63
3. Comparative ore reserve estimates of precious metal deposits in British Columbia.	63
4. Ore deposit modelling at the French Mine, Hedley Au-Camp, South - Central B.C..	63
5. Distribution of gold and associated alteration minerals, Mount Milligan Porphyry Gold deposit, North - Central B.C..	63
6. S - Isotopes of Barite: dating of volcanogenic deposits and discrimination of Ve in - Types from Stratiform Types.	63
7. Application of galena - lead isotopes in exploration on the Canadian Cordillera.	63
8. Open pit simulation studies.	75
9. Computerized open pit feasibility and design.	75
10. PCDEP/PCSIM Software package development for the economic.	79
11. Firm level productivity measurement for the Ontario metal mining Industry.	79
12. Towards more efficient R&D in the Ontario minerals sector.	78
13. R&D funding in the minerals sector.	79
14. Use of total tailings for backfill support.	76

PROJECT TITLE / TITRE DU PROJET	PAGE
15. Feasibility study for rehabilitation of Paymaster Orebody.	37
16. Calculation of ore reserves for mineral deposits other than uranium.	129
17. Study of small mine operating costs and development of suitable software to estimate operating costs.	129
18. Development of a software package to accommodate conceptual and operating mine design functions.	129
19. Study of mining methods relative to Canadian and non-canadian mines exploiting narrow-veined ore bodies. (Consortia)	131
20. Trials and evaluation of fracturing and in situ bacterial leaching of sub marginal uranium ore; ie. not in ore reserves.	41
21. Guidance systems for underground vehicles.	28
22. Copper and the world market.	86
23. Evaluation of non-parametric geostatistical techniques on the estimation of gold ore reserves (kriging, indicative and probabilistic).	95
24. Simulating mine ventilation systems and comparing with conventional and thermodynamic systems.	95
25. Estimation of underground air resistance (friction or k) factors.	95
26. Blasthole trajectory and open stope surveying.	87
27. Developments in geostatistics.	88
28. An expert system for geostatistical ore estimation.	88
29. Feasibility and economics of backfilling system.	88

PROJECT TITLE / TITRE DU PROJET	PAGE
30. Technical and economic feasibility of backfilling operation.	88
31. Development of microcomputer software for evaluating new mine investment proposals.	89
32. Optimization of mine development and operating variables.	89
33. Risk analysis in mining investments.	89
34. Simulation of mine development and operating decisions.	89
35. Modelling of the aggregate market of the Eastern United States.	89
36. Incorporation of environmental and social-economic criteria into project evaluation techniques.	90
37. Improving the use of mineral based building materials for shelter provision in Africa.	90
38. Portfolio of underground mining methods and operations.	139
39. Solution mining for disposal of salt tailings.	15
40. Slurry Pipeline Test Facility.	122
41. Exploration technology such as mineralogy, geology, geochemistry, X-ray diffraction and other related subjects.	122
42. Mineral processing facilities and services.	122
43. In situ performances comparison between sub-level caving and shrinking method for the mining of the East Lens deposit.	40
44. Investigation of the charateristics of Little Narrows Gypsum Anhydrite Plasters.	96

PROJECT TITLE TITRE DU PROJET	PAGE
45. Kerogen isolation from oil shales.	96
46. High temperature drilling muds.	96
47. Offshore aggregates and heavy minerals.	97
48. Feasibility of using mine waste as backfill material.	48
49. Study of alternative mining methods for use in narrow vein mining operations.	55
50. Reinterpretation of Point Aconi offshore seismic program.	142
51. Utilization of mine methane.	142
52. Optimization of metallurgical coal production.	142
53. Line addition to reduce acid leachate in high sulfur.	143
54. Posts in timbered drifts replaced with cable slings.	32
55. Evaluation of economic feasibility and technologies for using backfill in underground mines. (J. Leliévre and J. Ouellet)	93
56. Bucket load weighing unit for hydraulic shovels.	13
57. Investigation of light-charged particles emitted by rocks during fracture.	73
58. Electrokinetic dewatering of coal slurries.	145
59. Thick seam underground coal mining demonstration project.	21
60. Design of guidelines in a manual form for the primary evaluation of exploration properties or mine sites.	44

PROJECT TITLE TITRE DU PROJET	PAGE
61. Gold losses at Klondike placer mines.	101
62. Assessing gold recovery at Yukon placer mines with radiotracers.	101
63. Heath Steele Waste Rock Study - three phases.	60
64. Feasibility study of Norlartic Project.	43
65. PCDEP/PCSIM Software package development for the economic evaluation of ore deposits. The software will encompass, cost, taxation and revenue options available to exploration and mining companies.	34

3. SURFACE TECHNOLOGY

	PROJECT TITLE / TITRE DU PROJET	PAGE
1.	Cementation of waste rock to effect control of acid mine drainage.	14
2.	Sub-aerial tailings deposition.	14
3.	Noise abatement for surface ventilation fans.	14
4.	Overburden stabilization.	121
5.	Mineral inventory estimation and grade control in underground and open pit mining.	76
6.	Review of laboratory and in situ testing methods for establishing the physical and engineering properties of mine backfill materials.	127
7.	Determination of alternative backfill materials for Ontario mines (Ontario MDA).	128
8.	Backfill testing services, on a cost recovery basis.	128
9.	Developing field and laboratory methods, equipment and procedures to assess the suitability of rock formations for high-level radioactive waste containment.	128
10.	Develop new ore reserve evaluation methodologies.	128
11.	Develop new rock mechanics tests and test procedures, and provide rock testing services on cost recovery basis.	128
12.	Establish data bank on peak and residual rock strengths and other physical properties for rocks commonly encountered in Canadian mining operations.	128
13.	Development of a reliable high resolution radial monitoring device for recording changes in borehole diameter due to stress caused by mining operations.	129

PROJECT TITLE / TITRE DU PROJET	PAGE
14. Calculation of ore reserves for mineral deposits other than uranium.	129
15. Study of heat control in underground hardrock mines, especially control of heat flow in cold environment mines located in permafrost regions.	129
16. Ore grade control and blending requirements in mining operations.	129
17. Seismic characterization of discontinuities and anomalous rock faults in surface crown pillars using alteration and velocity imaging [9-9153] (Queen's University).	131
18. Recovery of surface crown pillars overlain by 40 m of overburden at Les Mines Selbaie using a controlled caving method of mining. [7-9195]	131
19. Field evaluation of the effectiveness of engineered soil covers for reactive tailings [0-9061]. (Noranda Research)	132
20. Slope deformation mechanism at Cassiar Mine [9-9227]. (Cassiar Mine)	132
21. Processes for obtaining environmentally safe uranium mill tailings.	68
22. Sonic drill - Use of high-frequency, mechanical oscillation to achieve faster drilling rates.	68
23. Hydraulic - mechanical interaction during in situ permeability tests.	85
24. Development of data concerning the hydraulic properties of road aggregates.	85
25. Influence of drill water on ground permeability measurement.	85
26. Determining the significance of permeability data obtained during pumping tests.	86

PROJECT TITLE / TITRE DU PROJET	PAGE
27. Impervious properties of soil-bentonite mixtures (water retention by tailings).	86
28. Anisotropy of the shear resistant clays.	86
29. Hydrogeological mapping of water-bearing risk zones.	86
30. Wet barriers for use on tailing areas where acid mine drainage is a problem.	86
31. Geotechnical design of impervious barriers in mine tailings that generate and waters.	85
32. Anisotropic effects of the shear resistance of clays on measurements by in situ shear testing.	85
33. Sofware program for the optimization of a strip mining operational plan.	86
34. Pattern recognition techniques applied to monitored drill performance data.	88
35. Incorporation of environmental and social-economic criteria into project evaluation techniques.	90
36. Information system and economics of small-scale mining and mineral processing on technology.	90
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Readers are invited to comment on this document. Such comments will be appreciated and will be examined prior to compiling future issues.

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